LEAFLETS

OF

PHILIPPINE BOTANY

Edited by A. D. E. ELMER, A. M.

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LEAFLETS OF PHILIPPINE BOTANY

EDITED BY A. D. E. ELMER, A. M.

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PHILIPPINE PIPERACEAE

BY

C. de Candolle

(*Geneva, Switzerland*)

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This paper is primarily founded on the specimens collected by *Mr. A. D. E. Elmer* and sent for determination to the author who is also publishing a complete revision of the Philippine *Piperaceae* in the Philippine Journal of Science.

PEPEROMIA Linn.

Peperomia reflexa subsessilifolia C. DC. Prod. XVI[1]; 452.

Luzon, Province of Benguet, Baguio (Mt. Santo Tomas), *Elmer*, n. 8576.

Succulent herbs, forming loose tufts upon moss covered trees and shrubs in dense woods at 7000 feet; older leaves yellowish green; spike strictly erect, also yellowish; stamens purplish. "Canapa" is the Igorot name for it. (*Elmer* ms.)

Peperomia exigua Miq. Syst. 77.

Mindanao, District of Davao, Todaya (Mt. Apo), *Elmer*, n. 11004.

Creeping and forming dense patches on wet ledges or

cliffs, in dense woods along the Baracatan creek at 1500 feet; stems succulent, terete, watery green, numerously branched, taking root at the nodes; petioles similar in color and texture, ascending; leaves flat, parallel with the surface of the rocks or boulders, much paler green beneath, succulent; tips of the branches or stems suberect, terminated into spikes, yellowish at first and brown when old. Local Bagobo name is "Sigbat-ta-pang-pang." (*Elmer* ms.)

Peperomia pellucidopunctulata C. DC. sp. nov.

Omnino glabra, foliis modice petiolatis elliptico-lanceolatis basi et apice acutis, 5-nerviis; pedunculis terminalibus, petiolos paullo superantibus; spicis folii limbum paullo superantibus subdensifloris; bractea orbiculari centro pedicellata, antheris parvis ellipticis; ovario emerso turbinato summo apice stigmatifero stigmate globoso, bacca subglobosa basi breviter attenuata.

Caulis inferne e nodis radicans, ramosus. Rami ut videtur erecti, circiter 25 cm. longi, in sicco 2.5 mm. crassi. Folia alterna. Limbi in sicco membranacei creberrime pellucido-punctulati, superi usque ad 42 mm. longi et 22 mm. lati. Petioli 9 mm., pedunculi 12 mm. longi. Spicae maturae 5 cm. longae, 1 mm. crassae. Rhachis sub bacca tarde in processum conicum producta. Bacca glandulis asperulata, fere 0.75 mm. longa.

Luzon, Province of Benguet, Baguio, *A. D. E. Elmer*,. n. 8436.

Negros, Province of Negros Oriental, Dumaguete (Cuernos Mts.), *A. D. E. Elmer*, n. 9970.

Succulent herb, upon moist densely shaded rocky cliffs or upon moss covered tree trunks near the ground. (*Elmer* ms.)

Peperomia negrosensis C. DC. sp. nov.

Foliis breviter petiolatis, superis elliptico-lanceolatis basi et apice acutis, utrinque glabris et margine ciliolatis, 3-nerviis nervuloque marginali ab apice fere usque ad medium decurrente; petiolo puberulo; pedunculis oppositifoliis glabris petiolos pluries superantibus; spicis maturis quam folii limbus

brevioribus, tenuibus; bractea orbiculari centro pedicellata, antheris ellipticis, ovario emerso subgloboso, summo apice stigmatifero, stigmate carnoso et puberulo, bacca globosa glandulis asperulata et sine pseudocupula.

Herba caule puberulo repente in sicco subcomplanato, ramulis puberulis, spiciferis circiter 7 cm. longis et 1 mm. crassis. Folia alterna. Limbi in sicco membranacei pellucido-punctulati, inferi elliptici basi et apice rotundati, usque ad 15 mm. longi et 9-13 mm. lati. Petioli usque ad 2 mm., pedunculi 10 mm. longi. Spicae bacciferae circiter 14 mm. longae, 0.5 mm. crassae. Rhachis sub bacca tarde in processum conicum producta.

Negros, Province of Negros Oriental, Dumaguete (Cuernos Mts.), *A. D. E. Elmer*, n. 9425.

Tufted and climbing upon moss covered rocks in well shaded ravines; leaves and stems succulent, the latter reddish; leaves darker green above and occasionally with a reddish tinge; spikes erect, yellowish green; anthers brown. (*Elmer* ms.)

Peperomia Elmeri C. DC. sp. nov.

Foliis elliptico-lanceolatis basi et apice attenuatis, 3-nerviis, supra glabris subtus haud dense pilosis, petiolo piloso; pedunculis axillaribus quam petioli triplo longioribus, tenuibus, glabris; spicis glabris, adultis foliorum limbos aequantibus; bractea orbiculari centro brevissime pedicellata, antheris ellipticis, ovario emerso ovato, paullo sub apice stigmatifero, stigmate punctiformi glabro, bacca globosa glandulis conspersa, sine pseudocupula.

Herba epiphyta succulenta, radices rubescentes, caulis in vivo teres appresse hirsutus, in sicco complanatus inferne usque ad 2 mm. crassus, simplex, 30 cm. longus. Folia alterna sat remota. Limbi in vivo subcoriacei, in sicco membranacei, 4 cm. longi, 29 mm. lati. Petiole 5 mm., pedunculi 15 mm. longi. Spicae adultae 4 cm. longae, in sicco 1 mm. crassae. Bracteae pelta fere 0.75 mm. baccaque 0.75 mm. diametro.

Mindanao, District of Davao, Todaya (Mt. Apo), *A. D. E. Elmer*, n. 10493.

Peperomia rivulorum C. DC. sp. nov.

Foliis modice petiolatis superis obovatis basi acutis 5-nerviis, utrinque petiolisque sat dense puberulis, pedunculis terminalibus hirtellis quam petioli duplo longioribus, spicis glabris adultis folia pluries superantibus, in vivo erectis, bracteae pelta rotunda centro brevissime pedicellata, antheris rotundato-ellipticis, ovario emerso oblongo-ovato paullulo sub apice stigmatifero, stigmate globoso glabro, bacca ovato-globosa glandulis asperulata.

Herba ad saxa in rivulis repens. Caules hirtelli in sicco 1 mm. crassi. Folia alterna. Limbi in vivo succulenti, rigidi, in sicco membranacei, superi circiter 14 mm. longi et 10 mm. lati, caulini elliptici basi acuti apice obtusi, usque ad 20 mm. longi et 12 mm. lati. Petioli 4-5 mm., pedunculi 10 mm. longi. Spicae adultae 4.5 cm. longae 1 mm. crassae. Rhachis post anthesin sub bacca conica producta. Bacca 0.5 mm. paullulo longior.

Mindanao, District of Davao, Todaya (Mt. Apo), *A. D. E. Elmer*, n. 11147.

Peperomia marivelesana C. DC. sp. nov.

Foliis modice petiolatis, ellipticis basi acutis apice breviter et obtuse attenuatis utrinque appresse et sat longe pilosis, margine ciliatis, 3-nerviis; petiolo dense hirsuto; pedunculo petiolum fere aequante hirsuto, spicis quam foliorum limbi subtriplo longioribus, filiformibus, glandulis conspersis, bracteae pelta orbiculari centro pedicellata, glandulis conspersa; antheris rotundatis, ovario emerso obovato, sub apice stigmatifero, stigmate glabro.

Herba repens carnosa. Caulis ramulique dense hirsuti. ramuli in sicco mm. 1 crassi. Folio alterna vel opposita. Limbi in sicco membranacei, pellucido-punctati, usque ad 26 mm. longi et 20 mm. lati. Petioli usque ad 8 mm. longi. Spicae florentes 15 mm. longae, 1 mm. crassae. Bracteae pelta 1.25 mm. diametro. Filamenta antheris breviora.

Luzon, Province of Bataan, Mount Mariveles, *A. D. E. Elmer*, n. 6820.

Succulent herbs on trees at 2000 feet. (*Elmer* ms.)

Peperomia pallidibacca C. DC. sp. nov.

Foliis modice petiolatis subobovato-ellipticis basi acutis apice subacutis, utrinque pilosulis, subtus crebre nigropunctulatis, 3-nerviis nervuloque marginali ab apice fere usque ad medium decurrente; petiolo hirtello; pedunculis terminalibus petiolos aequantibus, hirtellis; spicis folii limbum fere triplo superantibus subdensifloris; bractea orbiculari nigropunctulata centro breviter pedicellata; ovario emerso obovato nigropunctulato, paullo sub apice et inconspicue stigmatifero; bacca elliptica pallide virescente, laevi.

Herba inter muscos arboricola e nodis radicans. Ramuli spiciferi fere 9 cm. longi, dense hirtelli, 0.5 mm. crassi. Folia alterna. Limbi in sicco membranacei, superi usque ad 2 cm. longi et ad 12 mm. lati, inferi magis obovati et usque ad 23 mm. longi. Petioli usque ad 5 mm. longi. Spicae 0.5 mm. crassae. Rhachis tarde sub bacca in processum conicum producta. Bacca sessilis fere 0.75 mm. longa.

Luzon, Province of Benguet, Baguio (Mt. Santo Tomas), *A. D. E. Elmer*, n. 9344.

PIPER Linn.

Sarcostemon C. DC. sect. nov.

Spicae solitariae, oppositifoliae. Flores dioici. Bractea hypopeltata rhachi adnata, et tantum marginibus et extremitatibus libera. Stamen unicum, anthera in apice filamenti carnosi sita, bilocularis, rimis introrsis dehiscens; ovarium liberum. Bacca sessilis.

Piper korthalsii Miq. in Ann. Mus. Bot. Lugd. Bat. I; 139.

Luzon, Province of Benguet, Baguio, *Elmer*, ns. 5896, 8550, 5905 and 8760 fem. Province of Tayabas, Lucban, *Elmer*, n. 7967 fem.

Negros, Province of Negros Oriental, Dumaguete (Cuernos Mts.), *Elmer*, n. 9598 fem.

Climbing slender trees up to 15 feet, where it is bushy and much branched, in woods at 2000 feet; berries yellow, when fully mature reddish. (*Elmer* ms. for n. 7967).

Eupiper C. DC.

Spicae solitariae, oppositifoliae. Flores dioici, raro hermaphroditi. Bractae hypopeltata, libera et pedicellata aut centro subsessilis, vel rhachi adnata et tantum marginibus et extremitatibus libera. Stamina 2 lateralia, rarius 3 vel 4 quorum 2 lateralia. Ovarium liberum vel in rhachi partim immersum et inferne cum ea concretum.

Piper costulatum C. DC. sp. nov.

Foliis breviter petiolatis ovato-lanceolatis basi aequilatera cordatis vel repandis apice acute et sat longe acuminatis utrinque glabris, 7-9-nerviis, nervis lateralibus, extremis 2-3 quam alii tenuioribus et magis divaricantibus; petiolo glabro basi ima vaginante; stirpis masc. pedunculo glabro quam petiolus multo breviore, spica subflorente quam folii limbus quadruplo breviore, rhachi hirtella, bracteae glabrae pelta orbiculari paullo infra centrum pedicellata, staminibus 2 antheris ovatis parvis; stirpis fem. pedunculo ut in masc., spica quam folii limbus fere triplo breviore, cylindrica apice obtusa, rhachi hirtella, bracteae glabrae pelta orbiculari centro subsessili; bacca libera globosa, stigmatibus 3 oblongis et acutis.

Dioicum, in arboribus scandens. Ramuli glabri primum costulati dein teretes, spiciferi 1 mm. crassi; collenchyma in fasciculos discretos in costulis dispositum et haud libriforme, fasciculi intramedullares 1-seriati, canales lysigenes nulli, cellulae sclerosae interfasciculares, cum phloemate fasciculorum periphericorum continuae. Limbi in sicco tenuiter membranacei pellucidi et minute pellucido-punctulati, in masc. usque ad 6 cm. longi et 1.5 cm. lati; in fem. paullo breviores. Petioli circiter 7 mm., pedunculi 3 mm. longi. Stirpis masc. spicae florentes 1.25 mm., stirpis fem. 7 mm. crassae, baccae dense confertae 2 mm. crassae. Stigmata in apice baccae sessilia.

Luzon, Province of Bataan, Mount Mariveles, *A. D. E. Elmer*, n. 6805.

Upon small trees on a ridge at 3000 feet. (*Elmer* ms.)

Piper varibracteum C. DC. sp. nov.

Foliis longiuscule petiolatis, glabris, elliptico-lanceolatis,

basi aequilatera acutis apice attenuatis acutis, 5-nerviis, nervis adscendentibus centralibus tribus paullulo supra basin solutis; petiolo basi ima vaginante, stirpis fem. pedunculo glabro quam petiolus paullo breviore; spica cylindrica baccifera quam folii limbus pluries breviore; rhachi pilosa, bracteis glabris inferis rotundis superis transverse ellipticis, centro late sessilibus, baccis globosis liberis et condensis; stigmatibus 4 ovatis acutis.

Dioicum, scandens, caulis in vivo 1.5 cm. crassus, teres, glaber. Ramuli teretes glabri, spiciferi in sicco cinerescentes, 1.5 mm. crassi; collenchyma in fasciculos discretos a latere elongatos dispositum, haud libriforme, fasciculi intramedullares 1-seriati; canalis lysigenis unicus centralis. Limbi in sicco rigidi, minute pellucido-punctulati, circiter 8 cm. longi et 4 cm. lati. Petioli usque ad 25 mm., pedunculi 13 mm. longi. Spicae circiter 15 mm. longae et in sicco 5 mm. crassae, in vivo pendulae. Bracteae 0.75 mm. latae.

Mindanao, District of Davao, Todaya (Mt. Apo), *A. D. E. Elmer*, n. 11998.

Scandent upon trees and overtopping dense thickets along the sea coast on moist sandy soil; stem 1 inch thick, terete, flexible, covered with grayish brown smooth comparatively thick bark, numerously rebranched, obscurely nodulose; wood dull white, fibrous, soft; branchlets green, forming dense well interlaced masses which hang down in large streamers from the limbs of the trees; leaves descending, leathery, somewhat recurved and with twisted sides, very shining and deep green on the upper side, duller and paler beneath; fruits pendulous, leaf opposed, 0.5 to 0.75 inch long, cylindric or slightly thicker toward the base, yellow or orange red. "Manica-tapoi," is the Bagobo name. (*Elmer* ms.)

Piper cacuminum C. DC. sp. nov.

Foliis modice petiolatis ovato-oblongis basi ima aequilatera acutis apice longe attenuato-acuminatis, utrinque glabris, 5-nerviis; petiolo glabro ultra medium vaginante; stirpis fem. pedunculo glabro petiolum paullo superante; spica quam folii limbus pluries breviore, ovata, rhachis hirsuta, bracteae glabrae pelta rotunda centro pedicellata, ovario libero, stigmatibus 3 rotundis, baccis condensis ovatis apice acutis.

Dioicum, scandens. Ramuli glabri in sicco rubro-fusci, spiciferi 1-2 mm. crassi, costulati, collenchyma in fasciculos discretos in costulis dispositum et haud libriforme, canalis lysigenis nullus. Limbi in sicco membranacei minute pellucido-punctulati, 11 cm. longi et usque ad 37 mm. lati. Petioli 10 mm., pedunculi 15 mm. longi. Spica matura 15 mm. longa, 9 mm. crassa, flores in vivo albi. Baccae in vivo atro-rubrae in sicco fuscescentes, bracteae pelta 1 mm. diametro, stigmata in apice ovarii sessilia.

Luzon, Province of Bataan, Mount Mariveles, *A. D. E. Elmer*, n. 6890.

Rare, near the summit of the mountain. (*Elmer* ms.)

Piper miniatum Blm. in Verh. Bot. Genoots. XI; 166.

Luzon, Province of Bataan, Mount Mariveles, *Elmer*, n. 6683.

Piper miniatum [C] C. DC. forma nov.

Foliis ramulisque omnino glabris limbis coriaceis quam in typo multo angustioribus, ramulis fuscescentibus.

Luzon, Province of Tayabas, Lucban, *A. D. E. Elmer*, ns. 7384 and 7910.

A bushy climbing shrub, in woods at 2500 feet; branches many, the nodes much enlarged; wood coarsely grained but quite hard; bark also hard, brown, green on the twigs; coriaceous leaves dull, much paler beneath, nearly flat; staminate spikes pendulous, slender, 1.5 dm. long, pale yellow. (*Elmer* ms. for n. 7384)

Widely distributed also in India, the Malayan peninsula and archipelago.

Piper miniatum hirtellum C. DC. Prod. XVI^1; 355.

Chavica miniata hirtella C. DC.

Ramulis novellis petiolisque rufo-hirsutis, foliis subtus ad nervos pilosis.

Mindanao, District of Davao, Todaya (Mt. Apo), *A. D. E. Elmer*, n. 11229.

Scandent upon small trees in damp forests of a steep slope at 2500 feet of mount Burebid; stem 1 inch thick, terete, grayish brown mottled, flexible, branched; branches forming a dense tangled mass at the top, slender, drooping, freely rebranched, terete, green, quite rigid; leaves subchartaceous, descending, flat, dull green above, paler beneath; fruit terminal or leaf opposed, pendulous, upon a 1 to 2 inches long terete green stalk; spikes also terete, hard, quite smooth and rigid, dark brick red. The leaves of this species are the second best chewing for the natives. This species is called "Cabansal" by the Bagobos. (*Elmer* ms.)

Piper lageniovarium C. DC. sp. nov.

Foliis longe petiolatis, rotundato-ovatis, basi inaequilatera profunde cordatis, apice breviter et acute acuminatis, supra glabris subtus ad nervos minutissime puberulis, 10-plinerviis, nervo centrali nervos 2 adscendentes alternatim mittente, quorum supremus a 3-3.5 cm. supra basin solutus, nervis lateralibus in latere majore 4 in minore 3 a basi solutis; petiolo juniore hirtello cito glabro, basi vaginante; stirpis fem. pedunculo glabro quam petiolus breviore, spica florente folii limbum aequante apice attenuata, rhachi villosa, bracteae pelta rotunda glabra in margine crenulata pedicello oblongo membranaceo et villoso; ovario libero glabro, lageniformi, stigmatibus 3 brevibus et linearibus.

Dioicum, frutex 3-5 m. altus. Caulis glaber, teres, in vivo inferne 8-13 cm. crassus, in sicco sub pedunculis 8 mm. crassus, collenchyma haud libriforme in fasciculos a latere valde elongatos dispositum, sed subcontinuum, fasciculi intramedullares 2-seriati, canalis lysigenis unicus centralis. Limbi in sicco membranacei, minutissime pellucido-punctulati, 20 cm. longi, 19.5 cm. lati; basis lobi a summo petiolo divaricantes quorum alter 8 cm. alter 7 cm. longus. Petioli 3.5 cm., pedunculi 2.5 cm. longi. Spicae in vivo 26 mm., in sicco circiter 6 mm. inferne crassae. Bracteae pelta fere 1 mm. diametro. Ovarium 1.5 mm. longum superne attenuatum. Planta *P. methysticum Forst.* sat referens, limbis multiplinerviis ec spicis multo longioribus ac ramulorum structura et sexu ab eo discrepans.

Mindanao, District of Davao, Todaya (Mt. Apo), *A. D. E. Elmer*, n. 10589.

Cluster of large shrubs, in fertile soil of thickets or light woods; stems several, 10 to 15 feet high, erect, 3 to 5 inches thick at the base, ringed every foot or two, terete, white and greenish gray mottled, one half or more of the wood is pith, the other one half hard and rather heavy, odorless and tasteless; branches nodulose and rather slender; leaves subcoriaceous, nearly flat or conduplicate from the base only, much paler beneath; inflorescence opposite the lower leaves, recurvingly hanging, 0.5 inch thick, rat tail-like yellow, terete. "Cuyo" is the Bagobo name. (*Elmer* ms.)

Piper forstenii C. DC. Prod. XVI[1]; 348.

Mindanao, District of Davao, Todaya (Mt. Apo.) *Elmer*, n. 11179 fruit.

Scandent along small or medium sized trees, in dense forests of wet stony soil along the Sibulan river at 2500 feet; stem rigid, terete, 0.5 to 0.75 inch thick, dark green, longitudinally striate, branched all along but not numerously; branches divaricate, sparingly rebranched; leaves horizontal or only slightly descending, flat, rigidly chartaceous, darker green on the upper surface, the largest ones 3 feet long and proportionately wide; veins very conspicuous beneath, causing grooves on the upper side; infrutescence pendulous, upon 2 inches long green peduncles, terete, hard, quite rigid, nearly lemon yellow, more or less crooked and somewhat curved, 1 to 2 feet long. The Bagobos call it "Baragit". (*Elmer* ms.)

Piper aurilimbum C. DC. sp. nov.

Foliis breviter petiolatis, obovato-ellipticis, basi valde inaequilatera cordatis altero latere auriformi petiolum velante, apice acute acuminatis, supra glabris subtus ad nervos hirtellis, 7-plinerviis nervo centrali nervos 2 adscendentes alternatim mittente quorum supremus a 3 cm. supra basin solutus, nervis lateralibus adscendentibus utrinque 2 a basi solutis nervulisque validis pluribus a basi divaricantibus; petiolo hirsuto basi ima vaginante; stirpis fem. pedunculo hirsuto,

adulto petiolum paullo superante; spica florente quam folii limbus pluries breviore cylindrica apice rotundata, rhachi pilosa, bracteae pelta glabra rotunda pedicello longe piloso; ovario libero oblongo-ovato superne attenuato, stigmatibus 3 brevibus acutis.

Dioicum, suffrutex scandens. Ramuli juniores hirsuti, dein glabri, spiciferi 2 mm. crassi, collenchyma continuum et haud libriforme, fasciculi intramedullares 1-seriati, canales lysigenes peripherici nulli. Limbi in vivo subtus albido-virescentes, in sicco membranacei et creberrime pellucido-punctulati, usque ad 14.5 cm. longi et 7 cm. lati. Petioli usque ad limbi latus longius 5 mm., inter limbi latera 4 mm. longi. Pedunculi usque ad 20 mm. longi. Spica florens 25 mm. longa, 5 mm. crassa. Bracteae pelta 1 mm. diametro.

Luzon, Province of Benguet, Baguio, *A. D. E. Elmer*, n. 8866.

A climbing suffrutescent plant, with green stems; leaves very flexible, somewhat succulent, whitish green beneath; inflorescence erect, quite rigid, the spikes erect, straight and nearly perfectly cylindrical, pale white but soon turning dark green. Not common in damp gulches near Sablan. "Dawu-sha-atab" is the Igorot vernacular name. (*Elmer* ms.)

Piper pseudo-chavica C. DC. Prod. XVI[1]; 351.

Luzon, Province of Tayabas, Lucban, *Elmer*, n. 8142 fem.

Piper pseudo-chavica [C] **C. DC.** forma nov.

Ramulis et limbis glabris, petiolis subtus parce pilosis vel glabris, limbis 20 cm. longis et 7.5 cm. latis; zona cellularum sclerosarum haud continua.

Mindanao, District of Davao, Todaya (Mt. Apo), *A. D. E. Elmer*, n. 11417.

Climbing upon a tree fern, in moist woods at 5750 feet on mount Apo; stem 0.75 inch thick, round, crooked and nodulose; bark yellowish and covered with coarse lenticels; branches mostly at the top and forming a dense bush, slender, smooth, green, much thickened at the joints, the ultimate ones somewhat drooping; leaves horizontal or descending,

thinly coriaceous, flat, much lighter green beneath; peduncle green; spike cylindric, reddish brown when young; the young fruits yellowish green, 2 inches long. "Mani-ca-tapoi" is the Bagobo name. (*Elmer* ms.)

Piper cristatum C. DC. sp. nov.

Omnino glabrum, foliis modice petiolatis ellipticis basi ima fere aequilatera subacutis apice brevissime attenuatis, 7-plinerviis nervo centrali 2 cm. supra basin trifido nervisque adscendentibus utrinque 2 a basi solutis; petiolo basi vaginante; stirpis fem. pedunculo fere petiolum aequante; spica florente quam folii limbus paullo breviore; rhachi glabra; bractea obovata, rhachi late adnata, ovario libero, stigmatibus 3 minutis rotundatis.

Dioicum, scandens. Caulis teres in vivo 26 mm. crassus, longitudinaliter cristatus, cristae fere 0.5 mm. altae. Ramuli spiciferi in sicco 8 mm. crassi, collenchyma in fasciculos discretos sub cristis incrassatos dispositum et haud libriforme, fasciculi intramedullares 2-seriati, canales lysigenes plures quorum unus centralis alii peripherici. Limbi coriacei pellucido-punctulati 16 cm. longi, 11.5 cm. lati. Petioli 25 mm., pedunculi 30 mm. longi. Spicae florentes 13.5 cm. longi in sicco 5 mm. crassi. Bractea fere 4 mm. longa et 3 mm. lata, margine 0.5 mm. lato libera.

Mindanao, District of Davao, Todaya (Mt. Apo), *A. D. E. Elmer*, n. 10703.

Scandent upon moss covered trees, in very humid forests at 3500 feet along the Baruring river; stem terete, 1 inch thick, flexible, green, the internodes 6 inches long, 7 to 9-ridged longitudinally; branches toward the top, 25 feet from the ground, hanging, also rigid, lighter green, heavy; leaves horizontally spreading, nearly flat, very coriaceous, lucid dark green above, much paler and duller beneath; infrutescence pendulous, the receptacle turning bright yellow from base to apex; the pistillate flowers yellowish green. "Busok-buso" is the Bagobo name. (*Elmer* ms.)

Piper longistigmum C. DC. sp. nov.

Omnino glabrum, foliis modice petiolatis, elliptico-lance-

olatis basi aequilatera acutis apice acute acuminatis, 7-plinerviis, nervo centrali nervos 2 adscendentes utrinque alternatim mittente quorum supremus a 3 cm. supra basin solutus, nervo laterali adscendente aliis breviore utrinque a basi soluto; petiolo basi ima vaginante; stirpis fem. pedunculo petiolum duplo superante; spica florente quam folii limbus pluries breviore, cylindrica, apice acuta, bracteae pelta rotunda centro pedicellata; ovario libero conoideo, stigmatibus 3 vel 4 erectis longis et filiformibus.

Dioicum. Ramuli spiciferi 1.25 mm. crassi, collenchyma fere omnino libriforme, subcontinuum, fasciculi intramedullares 1-seriati, canalis lysigenis centralis periphericique numerosi. Limbi in sicco coriacei, pellucido-punctulati, usque ad 17 cm. longi et 47 mm. lati. Petioli 2.5 cm., pedunculi 5 cm. longi. Spica florens 17 mm. longa, 5 mm. crassa. Bracteae pelta fere 1 mm. diametro. Ovarium in apice attenuato stigmatiferum, stigmata 0.5 mm. longa.

Luzon, Province of Tayabas, Lucban, *A. D. E. Elmer*, n. 7578.

Piper albidirameum C. DC. in *Perkins'* Frag. Fl. Philip. 153.

Luzon, Province of Tayabas, Lucban, *Elmer*, n. 8117[a]

Scandent and forming tangled bushes on small trees of the woods at 2500 feet; stems 1 inch thick, soft and flexible, crooked and nodulose; bark yellowish gray, finely checked and toward the base warty; branches subdeflexed, green and smooth; leaves thick, leathery, spreading, deep shining green above, much paler beneath; inflorescence quite rigid, erect, leaf opposed in the uppermost leaves only; mature fruit deep red, hard, smooth. (*Elmer* ms.)

Piper albidirameum [D] C. DC. forma nov.

Limbis elliptico-lanceolatis, 16 cm. longis, 6 cm. latis, caeterum ut in specie.

Mindanao, District of Davao, Todaya (Mt. Apo), *A. D. E. Elmer*, n. 11056 fruit.

Luzon, Province of Tayabas, Lucban, *Elmer*, n. 7383.

In light woods at 1500 feet, in damp fertile soil; scandent and numerously branched all along, forming a dense jungle of leaves about or over its support; stem 0.5 inch thick, terete, greenish but roughened by numerous brown lenticels arranged longitudinally, soft and flexible; branchlets slender, lax, green and drooping; leaves coriaceous, descending, a trifle conduplicate on the upper deeper green surface, tips slightly recurved; cylindrical spikes 1 to 3 inches long, erect upon the greenish peduncle, rather hard, dull red, quite ornamental when fruits are ripe. "Cangol" is the Bagobo name. (*Elmer* ms. for n. 11056)

Piper pendulifolium C. DC. sp. nov.

Omnino glabrum, foliis breviter petiolatis, ample ovatis basi ima brevissime inaequilatera cordulatis apice brevissime acuminatis, a nervo centrali utrinque inaequilatis, 9-ninerviis nervo centrali altero latere nervum adscendentem altero nervos duos adscendentes mittente quorum supremus 7-9 cm. supra basin solutus, aliis nervis a basi solutis magis arcuatis quorum ultimi multo tenuiores; petiolo basi ima vaginante; stirpis fem. pedunculo petiolum fere aequante, spica quam folii limbus pluries breviore; bracteae glabrae pelta rotunda membranacea centro brevissime pedicellata, ovario inferne rhachi immerso superne umbonato, stigmatibus 3 rotundatis carnosis.

Dioicum scandens. Caulis fere 20 mm. crassus. Ramuli in sicco pallescentes, circiter 3 mm. crassi, collenchyma libriforme in fasciculos tenues a latere elongatos dispositum, fasciculi intramedullares 1-seriati, canales lysigenes plures quorum unus centralis aliique peripherici. Limbi in vivo coriacei, penduli supra obscure virescentes subtus pallidiores, circiter 22.5 cm. longi in medio a nervo centrali altero latere 8 cm. altero 6 cm. lati. Petiole usque ad 2 cm. longi. Pedunculi 1.5 cm. longi. Spica in vivo suberecta virescens et plerumque curvata, submatura 4.5 cm. longa et 3 mm. crassa. Bracteae pelta vix 1 mm. diametro. Stigmata in apice baccae sessilia, in viva fuscescentia.

Mindanao, District of Davao, Todaya (Mt. Apo), *A. D. E. Elmer*, n. 10942.

A tree climber in woods at 1500 feet along the Bara-

catan creek; stems at most 0.75 inch thick, terete, flexible, here and there branched from the nodes, the old ones thinly checked and grayish, smooth and green on the slender branchlets; leaves coriaceous, hanging, flat, dull deep green on the upper side, much paler or subglaucescent beneath; spikes terminally leaf opposed, suberect green and usually curved, the stigmas dull brown. "Manik-ka-tapai" is the Bagobo name. (*Elmer* ms.)

Piper puberulinodum C. DC. sp. nov.

Foliis modice petiolatis, ovatis basi aequilatera rotundatis apice acute et sat longe acuminatis, utrinque glabris, 7-plinerviis, nervo centrali nervos 2 alternatim mittente quorum supremus a 2-2.5 cm. supra basin solutus, nervis lateralibus adscendentibus utrinque 2 a basi solutis; petiolo inferne minutissime puberulo, fere usque ad medium vaginante; stirpis fem. pedunculo glabro petiolum paullo superante, uncinato; spica quam folii limbus pluries breviore, cylindrica, rhachi tomentosa, bractea semicirculari centro sessili; ovario inferne in rhachi profunde immerso, superne libero et tomentoso, stigmatibus 4-5, linearibus.

Dioicum, scandens. Caulis in vivo fere 8 cm. crassus, tuberculis obtusis dense munitus. Ramuli, nodis exceptis minute puberulis, glabri, in sicco juniores fuscescentes, vetustiores albescentes, spiciferi fere 2.5 mm. crassi, collenchyma in fasciculos discretos dispositum et zona interna libriforme, fasciculi intramedullares 1-seriati, canales lysigenes multi quorum unus centralis, alii peripherici, cellulae fuscae in cortice et in medullo crebrae. Limbi in sicco rigidi, rubello-pellucido-punctulati, usque ad 11.5 cm. longi et 6 cm. lati. Petioli usque ad 15 mm., pedunculi usque ad 23 mm. longi. Spicae 2.5-5 cm. longae, 8-12 mm. crassae. Bractea 1 mm. lata. Species *P. bathycarpi* et *P. betlei* promima, limbis rotundatis, nodis puberulis, stigmatibus longioribus ab illo; bracteae forma et nodis puberulis a *P. betleo* discrepans.

Mindanao, District of Davao, Todaya (Mt. Apo), *A. D. E. Elmer*, n. 11972.

Climbing upon large and small trees at 2500 feet; stem 3 inches thick or less in the smaller ones, tightly cleaving

to its support, nodulose, densely covered with blunt tubercles, yellowish gray; branchlets green, smooth, numerously rebranched; leaves coriaceous, descending, folded upon the upper lucid green surface, much paler beneath; fruits upon 1 inch long green peduncles arising opposite the leaves, 1 to 2 inches long; cylindric or more or less subnodulose 0.33 to 0.5 inch across, olive green. "Manica" is the Bagobo name. (*Elmer* ms.)

Piper betle Linn. Sp. Pl. 28: ed. II; 40.

Luzon, Province of Tayabas, Lucban, *Elmer*, n. 8108 fem.

Negros, Province of Negros Oriental, Dumaguete (Cuernos Mts.) *Elmer*, n. 9573 fem.

A lofty tree climber, forming dense tangled masses clear around the naked exposed stems; stems 0.75 inch thick, with smooth yellowish bark, nodose every 6 inches, tightly cleaving to its support; branches divaricately spreading, easily separating at the much thickened joints; coriaceous leaves subpendulous, shining green on the upper side, much paler beneath, conduplicate on the upper surface; the pendulous spikes yellowish green, the staminate slenderer and yellow. "Buyoc" is the local Visayan name. The peppery leaves of this species are chewed by the natives with lime and betel nut (a *Palmae* species which they call "Bunga"). The saliva and the mouth are colored a blood red by the mixture. (*Elmer* ms. for n. 9573).

Cultivated in all tropical countries.

Piper carnistilum C. DC. sp. nov.

Omnino glabrum, foliis sat longe petiolatis, ovatis basi aequilatera acutis apice longe et acute acuminatis, penninerviis, nervo centrali; nervos adscendentes 4 utrinque opposite aut subopposite mittente, quorum infimi fere a basi, supremi fere a 3.5 cm. supra basin soluti; petiolo basi ima vaginante; stirpis fem. petiolum fere aequante; spica subflorente quam folii limbus pluries breviore cylindrica, apice obtusa, bracteae pelta rotunda centro pedicellata pedicello crasso obconico; ovario inferne in rhachi immerso et cum ea concreto, superne in stilum carnosum producto, stigmatibus 3 linearibus, acutis.

Dioicum, scandens. Ramuli spiciferi 2 mm. crassi, collenchyma in fasciculos discretos dispositum, et haud libriforme, fasciculi intramedullares 1-seriati, canalis lysigenis unicus centralis, cellulae sclerosae interfasciculares cum fasciculorum periphericorum phloemate continuae. Limbi in vivo coriacei, in sicco firmo-membranacei, minute pellucido-punctulati, usque ad 14 cm. longi et 6.5 cm. lati. Petioli superi 22 mm. longi. Spica subflorens sub 3 cm. longa et fere 4 mm. crassa. Bracteae pelta fere 0.75 mm. diametro.

Luzon, Province of Tayabas, Lucban, *A. D. E. Elmer*, n. 8094.

Climbling and forming bushes on trees and shrubs in a ravine along a rivulet at 2000 feet; younger branches subpendulous, green, very nodulose; leaves coriaceous, very lucid green on the upper surface, recurved, only slightly conduplicate on the upper side, dull green below; inflorescence erect, leaf opposed, rich yellowish green, upon green pedicels (*Elmer* ms.)

Piper abbreviatum Opiz in *Presl's* Reliq. Haenk. 157.

Mindanao, District of Davao, Todaya (Mt. Apo), *Elmer*, ns. 11049 fem. and 11077 masc.

Scandent along small tree trunks, in dry woods of fertile soil at 1500 feet; stem less than 0.5 inch thick, subterete, smooth, brownish when old, very numerously branched, forming dense bushy masses; branches divaricate, freely rebranched, 1 to 2 feet long, green, numerously nodulose, ascending toward the tips; leaves slightly ascendingly curved, dark lucid green above, much paler and duller beneath, thinly coriaceous; spikes terete, strictly erect, 2 to 3 inches long, greenish yellow and when old grayish brown. The Bagobos call it "Mani-ca-topay". (*Elmer* ms. for n. 11077).

Piper rhombophyllum C. DC. Prod. XVI^1; 352.

Luzon, Province of Tayabas, Lucban, *Elmer*, n. 8233.

Piper baguionum C. DC. sp. nov.

Foliis modice vel longiuscule petiolatis, ovatis inferne

subattenuatis et basi ima aequilatera acutis apice acute acuminatis utrinque glabris, 7-plinerviis nervo centrali 1 cm. supra basin trifido, nervisque adscendentibus utrinque 2 a basi solutis; petiolo glabro paullo ultra basin vaginante; stirpis fem. pedunculo glabro quam petiolus paullo breviore, spica matura quam folii limbus pluries breviore, cylindrica apice rotundata vel irregulari et incomplete maturescente, rhachi hirsuta, bractea glabra transverse elliptica, centro sessili; baccis inferne rhachi immersis, superne liberis globosis glabris, apice breviter stiliferis, stigmatibus 3 vel 4 lanceolatis.

Dioicum, scandens. Ramuli glabri, spiciferi 1.5 mm. crassi, collenchyma in fasciculos discretos dispositum, haud libriforme, fasciculi intramedullares 1-seriati, canalis lysigenis unicus centralis. Limbi in sicco rigidi, sat crebre pellucido-punctulati, usque ad 9 cm. longi et 4 cm. lati. Petioli adulti usque ad 3 cm. longi. Spica matura quando regularis 2.5 cm. longa et 2 cm. crassa in sicco rubescens.

Luzon, Province of Benguet, Baguio, *A. D. E. Elmer*, n. 8784.

Leaves flexible but thick and leathery, olive green above, much paler beneath; fruit recurved from leaf axils, solitary, very irregular in shape, more or less gnarly, red. Below the barrio of Bacaken. (*Elmer* ms. for n. 8784)

Piper corylistachyon C. DC. Prod. XVI[1]; 346.

Luzon, Province of Laguna, Los Baños, *Elmer*, n. 8201[a] masc.

Piper rectrofractum Vahl Enum. I; 314.

Luzon, Province of Bataan, Mount Mariveles, *Elmer*, n. 6862.

Piper striatum C. DC. sp. nov.

Omnino glabrum, foliis modice petiolatis ovato-lanceolatis basi ima distincte inaequilatera utrinque acutis vel altero latere subrotundatis, apice obtusiuscule attenuatis penniner-

viis, nervo centrali nervos adscendentes altero latere 2 altero 3 mittente; petiolo basi ima vaginante; stirpis masc. pedunculo petiolum duplo superante, tenui, spica quam folii limbus fere dimidio breviore, bracteae pelta rotunda sessili; staminibus 2, antheris rotundatis quadrivalvatis quam filamenta oblonga paullo latioribus.

Dioicum, epiphyticum. Ramuli in sicco flavescentes, adulti longitudinaliter striati, juveniles brevissime costulati, spiciferi 0.5 mm. crassi, collenchyma fere omnino libriforme in fasciculos tenues a latere elongatos dispositum, fasciculi intramedullares 1-seriati, canales lysigenes multi quorum unus centralis. Limbi in sicco rigidi pellucido-punctulati superi usque ad 8 cm. longi et 3.5 cm. lati; inferi saltem 21 cm. longi. Petioli usque ad limbi latus longius 2 mm., inter limbi latera 5 mm. longi. Pedunculi circiter 20 mm. longi 0.5 mm. crassi; spicae florentes in specimine vivo usque ad 5.5 cm. longae et 2 mm. crassae, in vivo usque ad 21 cm. longae. Rhachis canalibus lysigenibus multis ut in ramulo munita. Bracteae pelta 1 mm. diametro.

Mindanao, District of Davao, Todaya (Mt. Apo), *A. D. E. Elmer*, n. 11764.

In light woods of fertile soil at 3000 feet; main branches a few inches thick, widely spreading, freely rebranched; wood soft, green, pepperish in taste, with a large pith; bark greenish or turning brownish, smootish, minutely checked or cracked longitudinally and more or less lenticelled; branchlets numerous, crookedly rebranched, forming dense bushes, yellowish green with ascending green tips; old leaves rigidly coriaceous, recurved and strongly folded upon the upper duller green surface, smaller leaves lighter green and lucid on the upper side, old leaves 6 inches long at least and coarsely rugose on the upper side, nervose beneath; peduncle green, pendulously recurved; the flowering spikes pendulous, 3 to 6 inches long, usually curved or wand-like, terete, otherwise light yellow. "Maiucaw" is the Bagobo vernacular name. (*Elmer* ms.)

Piper oblongibaccum C. DC. sp. nov.

Foliis brevissime petiolatis elliptico-lanceolatis basi inae-

quilatera altero latere rotundatis altero subacutis, apice longe et acute acuminatis supra glabris subtus basi ad nervum centralem parce pilosis, 9-ninerviis, nervo centrali nervos 2 adscendentes utrinque mittente quorum superus ex 3.5 cm. supra basin inferusque paullo supra basin soluti, nervis lateralibus 2 subadscendentibus a basi solutis; petiolo piloso basi ima vaginante; stirpis fem. pedunculo tenui petiolum multo superante superne parce piloso, spica matura quam folii limbus pluries breviore cylindrica apice rotunda, rhachi pilosa, bracteae pelta glabra lunulata centro longe pedicellata pedicello lineari dense piloso; bacca obovato-oblonga, stigmate orbiculari juniore supra trisulcato.

Dioicum, scandens. Ramuli ad nodos pilosi et superne altero latere linea duplici pilorum a petiolo decurrente instructi, spiciferi 0.75 cm. crassi, collenchyma in fasciculos discretos dispositum haud libriforme et zona continua cellularum sclerosarum externe circumdatum, canalis lysigenis unicus centralis. Limbi in sicco firmi obscure virescentes, crebre pellucido-punctulati, usque ad 16 cm. longi et 5 cm. lati. Petioli usque ad limbi latus longius 2.5 mm. et inter limbi latera 2 mm. longi. Pedunculi 26 mm. longi. Spica matura 3 cm. longa, 7 mm. crassa. Bracteae pelta 0.75 mm. lata. Spica in vivo atropurpurea et fere nigra. Bacca 2 mm. longa, superne 1 mm. crassa. Stigma in apice ovarii sessile.

Negros, Province of Negros Oriental, Dumaguete (Cuernos Mts.), *A. D. E. Elmer*, n. 9456.

A scandent and much ramifying shrub, in woods at 4000 feet on a densely forested trail leading to the lesser peak; stem gray, tightly cleaving to trunks of tree ferns; its wood has a peppery odor; leaves paler beneath, subcoriaceous, descending; fruits pendulous, leaf opposed at the apex of the branches, 0.5 inch thick by 1.5 inches long, cylindric in shape, of a rich dark claret color when mature and strongly peppery in flavor. "Buyoc-buyoc" is the local Visayan name. (*Elmer* ms.)

Piper delicatum C. DC. sp. nov.

Foliis breviter petiolatis, anguste ovato-lanceolatis inferne subattenuatis et basi ima aequilatera vel leviter inaequilatera,

acutis apice acute et sat longe acuminatis, supra glabris vel ad nervos parcissime puberulis, 5-plinerviis nervis adscendentibus, centrali a 5 mm. supra basin trifido, nervo laterali utrinque a basi soluto; petiolo puberulo basi ima vaginante; pedunculo glabro petiolum fere aequante; stirpis masc. spica florente quam folii limbus pluries breviore, rhachi hirtella; bracteae glabrae pelta rotunda, pedicello brevi et lato; staminibus 2, antheris rotundatis; stirpis fem. spica matura quam folii limbus pluries breviore cylindrica apice obtusa, bracteae glabrae pelta rotunda centro subsessili, rhachi ut in mare; ovario libero rotundato, glabro, apice brevissime attenuato, stigmatibus 3-4 linearibus, bacca ovata apice subacuta.

Frutex delicatus, ad arbores parvas scandens. Ramuli juniores hirtelli, in sicco fusci, adulti glabri et pallidi, teretes, spiciferi 1 mm. crassi, collenchyma in fasciculos discretos dispositum et haud libriforme, fasciculi intramedullares 1-seriati, canales lysigenes nulli, cellulae fuscae magnae in cortice sparsae. Limbi in sicco tenuiter membranacei, minute et creberrime pellucido-punctulati, usque ad 8 cm. longi et 2.5 cm. lati. Petioli 6 cm. longi. Spica fem. baccifera 15 mm. longa, 7 mm. crassa, in vivo erecta et rubra. Ovarium basi late sessile. Bacca 2 mm. longa.

Luzon, Province of Benguet, Baguio (Mt. Santo Tomas), *A. D. E. Elmer*, n. 8583 masc.

Scandent shrubs upon trees and undershrubs and forming bushes in the oak woods at 7000 feet of mount Santo Tomas; male inflorescence erect; branches lax, often pendulous; wood pliable and tough; old bark yellowish, rather thick and coarsely checked; leaves spreading, dark green above, paler beneath, soft. (*Elmer* ms.)

Piper laxirameum C. DC. sp. nov.

Omnino glabrum, foliis modice petiolatis, oblongo-ovatis, basi aequilatera rotundatis apice acute acuminatis, 7-plinerviis, nervo centrali a 5 mm. supra basin trifido, nervis lateralibus arcuato-adscendentibus utrinque 2 a basi solutis; petiolo basi vaginante, stirpis fem. pedunculo petiolum fere triplo superante, spica pendula folii limbum fere duplo superante, bractea elliptica rhachi adnata et margine sat late

libera; staminibus 3, antheris reniformibus quadrivalvatis, filamentis oblongis antheras latitudine aequantibus.

Dioicum, scandens. Caulis digitum minimum crassus. Ramuli laxi, laeves, spiciferi 1 mm. crassi, collenchyma libriforme in fasciculos discretos dispositum, fasciculi intramedullares 1-seriati, canales lysigenes peripherici nulli. Limbi in vivo coriacei, in sicco rigidi, crebre pellucido-punctulati, 7 cm. longi, 3 cm. lati. Petioli 1 cm., pedunculi 3.5 cm. longi, spica florens 14 cm. longa, 3 mm. crassa. Bractea 2.5 mm. longa, 1.5 mm. lata. Antherae 0.5 mm. longae, 1 mm. latae.

Mindanao, District Davao, Todaya (Mt. Apo), *A. D. E. Elmer*, n. 10503.

Small climber, in dense humid woods of fertile deep ravines at 4000 feet; stems the thickness of a man's little finger, green, lenticelled, nodulose; branches many, lax, forming loose hanging masses; leaves coriaceous, dull green above, with recurved tips, much paler green beneath; spikes cylindric, pendulous from green peduncles, about 5 inches long, dark green. "Mani-ka-topoi" is the native or Bagobo name. (*Elmer* ms.)

Piper crassinodum C. DC. sp. nov.

Foliis breviter petiolatis elliptico-lanceolatis basi leviter inaequilatera altero latere rotundatis obtusisve altero attenuatis apice acute acuminatis, supra glabris subtus, praesertim in mare, ad nervos parcissime puberulis, penniverviis nervo centrali nervos adscendentes utrinque 4 mittente quorum superus ex 3 cm. supra basin solutus; petiolo glabro usque ad limbi latus longius vaginante; stirpis masc. spica quam folii limbus pluries breviore in vivo erecta, staminibus 2, antheris obovatis quam filamenta longioribus et latioribus; stirpis fem. pedunculo adulto petiolum paullo superante; spica in vivo erecta, matura quam folii limbus pluries breviore, cylindrica apice rotundata, rhachi glabra, bracteae glabrae pelta rotunda centro subsessili; bacca inferne in rhachi immersa superne libera et globoso-umbonata, stigmatibus 3 brevibus linearibus.

Dioicum, frutex 1 m. altus. Ramuli glabri nodis crassis, spiciferi usque ad 2.5 mm. crassi, collenchyma haud libriforme

in mare continuum, in femina in fasciculos discretos dispositum, fasciculi intramedullares 1-seriati, canalis lysigenis unicus centralis. Limbi in sicco membranacei, minutissime pellucido-punctulati, usque ad 13 cm. longi et 5.5 cm lati. Petioli usque ad limbi latus longius 7 mm., inter limbi latera 2 mm. longi. Pedunculi 13 mm. longi. Spica fem. matura in vivo rubra, in sicco rubiginosa 20 mm. longa, 8 mm. crassa. Bracteae pelta fere 0.75 mm. diametro. Stigmata in apice ovarii sessilia.

Luzon, Province of Tayabas, Lucban, *A. D. E. Elmer*, ns. 8042 masc. and 7626[a] fem.

Local but forming copses in damp forests at 3500 feet of mount Banahao; low shrubs about 3 feet high but more widely spreading; stems and branches comparatively few, soft, with large nodes; green leaves submembranous, dark green above, much lighter underneath; inflorescence erect, the undeveloped green portion deflexed. (*Elmer* ms. for n. 8042)

Piper parcirameum C. DC. sp. nov.

Foliis breviter petiolatis, elliptico-oblongis basi inaequilalatera utrinque acutis apice acute et sat longe acuminatis, supra glabris subtus ad nervos nervulosque hirtellis, penninerviis nervo centrali usque ad 0.5 longitudinis suae nervos adscendentes alternos utrinque 4 mittente; petiolo glabro basi vaginante; stirpis fem. pedunculo glabro petiolum aequante, spica quam folii limbus pluries breviore, cylindrica, rhachi hirsuta, bracteae pelta glabra subelliptica, centro sat longe pedicellata pedicello sat longe villoso; bacca globosa apice mucronulata, stigmatibus 3 minutis.

Dioicum. Suffrutex 1-3 ped. altus, parce ramosus ramulis suberectis. Caulis glaber, inferne saepe repens et e nodis radicans, superne circiter 3 mm. crassus; collenchyma continuum et haud libriforme, cellulis fuscis intermixtum, fasciculi intramedullares 1-seriati, canalis lysigenis unicus centralis, cellulae sclerosae interfasciculares cum phloemate fasciculorum periphericorum continuae. Limbi in vivo subcoriacei in sicco membranacei, minute pellucido-punctulati et utrinque punctulis atrorubescentibus conspersi, usque ad 19 cm. longi et fere ad 6 cm. lati, nervuli in vivo subtus albicantes. Pe-

tioli usque ad limbi latus longius 10 mm., inter limbi latera 7 mm. longi. Pedunculi fere usque ad 15 mm. longi. Spica in vivo flavicans, erecta, 13 mm. longa matura usque ad 5 mm. crassa. Bracteae pelta 1 mm. longa et paullo latior. Bacca 1.5 mm. diametro.

Mindanao, District of Davao, Todaya (Mt. Apo), *A. D. E. Elmer*, ns. 10899 and 11274.

A lax undershrub, 2 feet high, in moist humus covered fertile soil of dense forests at 3000 feet of mount Calelan; stems 1 or more from the same root, reclining and with ends erect or suberect, less than 0.5 inch thick, terete, nodulose, smooth, green; branches erect from the reclining stem; leaves coriaceous, divaricate, dark green above, conspicuously whitened beneath; spikes erect, upon 1 inch long green terete peduncles, from creamy white to yellow. "Salimbangan" and "Parooan are the names given to these two specimens by the Bagobos. (*Elmer* ms. for n. 11274).

Piper ovatibaccum C. DC. sp. nov.

Foliis breviter petiolatis, ovato-vel elliptico-lanceolatis, basi leviter inaequilatera in mare utrinque acutis, in femina utrinque acutis vel altero latere rotundatis, apice acute et sat longe acuminatis, supra subtusque haud dense pilosis, 7-plinerviis, nervo centrali a 5-10 mm. supra basin trifido, nervis lateralibus adscendentibus utrinque 2 a basi solutis; petiolo dense piloso paullo ultra basin vaginante; stirpis masc. pedunculo glabro quam petiolus paullo breviore, spica florenti limbi dimidium fere aequante, rhachi dense pilosa, bracteae glabrae pelta rotunda centro subsessili; staminibus 2 antheris ovato-globosis; stirpis fem. pedunculo rhachi et bractea ut in mare, ovario libero ovato glabro, stigmatibus 3 ovato-acutis, bacca ovata apice subacuta.

Dioicum, scandens. Ramuli primum dense villosi dein glabri et lenticellis concoloribus asperulati, spiciferi 1.5 mm. crassi, collenchyma haud libriforme, in fasciculos discretos dispositum vel subcontinuum, fasciculi intramedullares 1-seriati, canales lysigenes peripherici nulli. Limbi in sicco membranacei creberrime et minute pellucido-punctulati, 9.5-10 cm. longi, 3.5 to 4.5 cm. lati. Petioli 7 ad 8 mm., pe-

dunculi circiter 5 mm. longi. Spica masc. fere 4.5 cm. longa et 1.5 mm. crassa, fem. 1.5-2 cm. longa et 6-8 mm. crassa. Bracteae pelta fere 0.75 mm. diametro. Bacca fere 2 mm. longa, in sicco fuscescens.

Luzon, Province of Tayabas, Lucban, *A. D. E. Elmer*, ns. 7888 masc. and 8106 fem.

Laxly branched shrubs climbing about small stems of shrubs and trees near the ground in woods at 2250 feet; spicate inflorescence erect, that portion in anthesis white, below this yellow, above it green; its old gray bark coarsely checked; leaves membranous. (*Elmer* ms. for n. 7888).

Piper toppingii C. DC. sp. nov.

Foliis brevissime petiolatis, ovato-lanceolatis basi ima leviter inaequilatera altero latere attenuatis altero anguste rotundatis vel utrinque rotundatis, apice longe et obtusiuscule acuminatis, junioribus supra praesertim ad nervum centralem hirtellis dein glabris subtus ubique et sat dense hirsutis, nervo centrali nervos 2 adscendentes utrinque alternatim mittente, quorum superus a 2 cm. supra basin solutus, nervis lateralibus altero latere 2-3, altero 3-4 a basi solutis, quorum superi adscendentes alii magis arcuati et breviores; petiolo dense hirsuto; stirpis masc. pedunculo hirsuto petiolum pluries superante, spica florente quam folii limbus fere triplo breviore, rhachi dense hirsuta-bracteae pelta glabra glandulis farcta et in sicco supra pulverulen, ti albicante, staminibus 2, filamentis latis et brevibus, antheris secundum rhachin oblongo-ellipticis; stirpis fem. pedunculo et rhachi ut in mare, bracteae pelta ut in mare pedicello longo et hirsuto, ovario, libero rotundato glabro, stigmate minuto 3-lobulato, baccis subtrigono-obovatis condensis.

Dioicum, scandens. Ramuli in sicco albido-villosi pilis 2 mm. longis, spiciferi 2 mm. crassi, collenchyma libriforme in fasciculos a latere valde elongatos dispositum, fasciculi intramedullares 1-seriati, canalis lysigenis unicus centralis. Limbi in sicco rigidi pellucido-punctulati et in femina punctis albidis conspersi, usque ad 13 cm. longi et 4 cm. lati. Petioli 3-5 cm. longi, pedunculi in mare 25 in femina 40 mm-longi. Spica in mare 4.5 cm. longa, 2.5 mm. crassa, in femina 7 cm. longa, 5 mm. crassa. Bracteae pelta 0.75 mm.

diametro. Ovarium pellucido-glandulosum. Bacca 1.5 mm. longa

Luzon, Province of Benguet, Baguio, *A. D. E. Elmer*, ns. 8375 and 5850.

A scandent numerously branched suffrutescent species, in hardwood jungles of the pine region at 4000 feet, forming bushes upon tree trunks; leaves subcoriaceous; stem quite tough; fruit green when collected; inflorescence pale yellow. "Dawut" is the Igorot name. (*Elmer* ms. for 8375)

Piper obovatibracteum C. DC. sp. nov.

Foliis breviter petiolatis ovato-lanceolatis basi aequilatera acutis apice longe et acute acuminatis utrinque villosis, 5-7-plinerviis nervo centrali nervos adscendentes 2 mittente quorum supremus a 8 mm. supra basin solutus, nervis lateralibus adscendentibus utrinque 1-2 a basi solutis; petiolo villoso basi ima vaginante; stirpis masc. pedunculo tenuiter filiformi villoso petiolum pluries superante, spica filiformi limbi dimidium fere aequante, rhachi dense hirtella, bracteae pelta carnosa in sicco nigra, obovata inferne attenuato-acuta, centro subsessili, staminibus 3, antheris reniformibus filamenta gracilis superantibus.

Dioicum, ad frutices et arbores scandens. Ramuli villosipilis 1.5 mm. longis, spiciferi 0.5 mm. crassi, collenchyma continuum zona interna partim libriforme, fasciculi intramedullares 1-seriati, canales lysigenes plures quorum unus centralis aliique peripherici. Limbi in sicco ut in vivo membranacei pellucido-punctulati, superi usque ad 9 cm. longi et 2.5 cm. lati, inferi ovato-lanceolati basi aequilatera rotundati apice longe et acute acuminati, 10 cm. longi. Spica fere 4 cm. longa. Bracteae pelta 0.75 longa.

Luzon, Province of Tayabas, Lucban, *A. D. E. Elmer*, n. 7927.

Twining upon shrubs and small trees, forming laxly branched bushes not far up from the ground, at 2500 feet of mount Banahao; old stems flexible, barely the thickness of a little finger, brown, roughened with lenticels; leaves flat, soft, membranous, much paler beneath; inflorescence usually from the terminal leaf axils, greenish, very slender. (*Elmer* ms.)

Piper interrumptum multiplinervum C. DC. var. nov.

Scandens, limbis 10.5 cm. longis 4.5 cm. latis in sicco pellucido-punctulatis, 5-plinerviis nervo centrali a 4 mm. supra basin trifido, 10-11 cm. longis, 4-6 cm. latis, pedunculo petiolum duplo superante, 7 cm. longo, rhachi in mare glabra in femina parce pilosa, staminibus 3 antheris reniformibus, stigmatibus 4, ovato-acutis, bacca globosa.

Luzon, Province of Bataan, Mount Mariveles, *A. D. E. Elmer*, n. 6855.

Piper davaoense C. DC. in *Perkins'* Frag. Fl. Philip. 154.

Mindanao, District of Davao, Todaya (Mt. Apo), *Elmer*, n. 11065.

In dry woods, along a ridge of the Baracatan creek at 1750 feet; scandent upon small tree trunks and forming loose hanging masses; inflorescence dark green, hanging in a twisting and curving manner. "Manika-ta-poe" is the Bagobo name. (*Elmer* ms.)

Piper apoanum C. DC. sp. nov.

Foliis breviter petiolatis, ovato-oblongis, basi aequilatera rotundatis cordulatisve, apice obtusiuscule acuminatis utrinque glabris, 5-plinerviis, nervo centrali 1 cm. supra basin trifido, nervo laterali adscendente utrinque a basi soluto; petiolo supra in margine minute puberulo, fere usque ad medium vaginante; stirpis fem. pedunculo glabro tenui quam petiolus multo longiore, spica quam folii limbus pluries breviore, rhachi minutissime puberula; bracteae glabrae pelta rotunda, carnosa, centro brevissime pedicellata; bacca libera glandulis conspersa subglobosa stipitem suum paullo superante.

Dioicum, in solo sicco inter bambusas subscandens. Ramuli glabri, teretes, laeves, spiciferi 1 mm. crassi, collenchyma libriforme in fasciculos discretos tenues dispositum, fasciculi intramedullares 1-seriati, canalis lysigenis unicus centralis. Limbi in sicco membranacei, in vivo subtus glaucescentes, superi usque ad 10 cm. longi et 32 mm. lati, inferi ovato-oblongi basi cordati, usque ad 14 cm. longi et 5 cm. lati in

sicco subcoriacei et opaci. Petioli 8 mm., pedunculi 20 mm. longi. Spica 20 mm. longa, in vivo suberecta. Bracteae pelta 0.5 mm. diametro. Bacca submatura 3 mm. longa, in sicco fuscescenti-flavescens, in sicco nigra.

Mindanao, District of Davao, Todaya (Mt. Apo), *A. D. E. Elmer*, n. 11174.

In dry soil of bamboo thickets at 2500 feet near the Sibulan river; stem flexible, terete, crooked, rather smooth, gray and brown mottled, branched, subscandent; branches green and divaricate; leaves descending, the sides curved upon the glaucous lower surface, dull deep green above; infrutescence suberect, upon strict green peduncles; fruits shining, yellowish brown, subglobose or subellipsoid. "Manica-tapay" is the vernacular Bagobo name. (*Elmer* ms.)

Piper negrosense C. DC. sp. nov.

Foliis breviter petiolatis anguste ovato-oblongis, basi levissime inaequilatera obtusis, superne longe attenuatis et summo apice obtusiusculis, utrinque glabris vel subtus ad nervum centralem parcissime hirtellis, 5-plinerviis, nervo centrali nervos 2 adscendentes opposite vel subopposite mittente quorum supremus a 5-8 mm. supra basin solutus, nervo laterali adscendente utrinque a basi soluto; petiolo dense hirtello basi ima vaginante; stirpes masc. pedunculo hirtello petiolum fere triplo superante, spica florente quam folii limbus pluries breviore, cylindrica apice attenuata, rhachi dense hirsuta, bracteae pelta rotunda carnosa margine ciliolata, centro pedicellata pedicello hirsuto, staminibus 2 antheris rotundatis quam filamenta multo brevioribus; stirpis fem. pedunculo petiolum fere duplo superante, spica matura quam folii limbus pluries breviore, rhachi hirsuta, bractea ut in mare sed paullo minore, ovario libero glabro, stigmatibus 4 ovato-acutis, bacca ovato-globosa stipitem suum superante.

Dioicum, scandens. Ramuli teretes laeves, juniores puberuli cito glabri, spiciferi 1 mm. crassi, collenchyma libriforme in fasciculos discretos tenues dispositum, fasciculi intramedullares 1-seriati, canalis lysigenis unicus centralis. Limbi in sicco membranacei minute pellucido-punctulati usque ad 11 cm. longi et ad 18 mm. lati, inferi ovato-acuminati basi aequi-

latera cordati usque ad 7 cm. longi et ad 37 mm. lati. Petioli superi usque ad limbi latus longius 5 mm., inter limbi latera vix 1 mm. longi. Pedunculi in mare 20 mm. in femina 12 mm. longi. Spica masc. 20 mm. longa, 2 mm. crassa, fem. circiter 15 mm. longa. Bracteae pelta in mare 1.5 mm. in fem. 1 mm. diametro. Bacca 5 mm. longa, 4 mm. crassa.

Negros, Province of Negros Oriental, Dumaguete (Cuernos Mts.), *A. D. E. Elmer*, n. 9482 masc.

A delicate numerously branched climber upon low trees and sprawling over boulders in the hemp region at the 3000 feet; stems smooth, flexible, covered with brown bark, 0.33 inch thick; ultimate branches very thin, green, flexible; inflorescence terminal and subterminal, leaf opposed, erect, 1 inch long, pale creamy white; leaves flat, gradually recurved, much paler beneath, comparatively thin. "Lawingan-ihalas" is the local Visayan name. (*Elmer* ms.)

Piper marivelesanum C. DC. in *Perkins'* Frag. Fl. Philip. 155.

Luzon, Province of Tayabas, Lucban, *Elmer*, n. 8303.

Piper caninum latibracteum C. DC. var. nov.

Ramulis dense villosis, late ovatis basi aequilatera rotundatis apice longe et acute acuminatis, supra parce subtus densius pilosis, 7-plinerviis, 8.5 cm. longis 5 cm. latis, bracteae glabrae pelta rotunda 1.5 mm. diametro.

Luzon, Province of Tayabas, Lucban, *A. D. E. Elmer*, ns. 7627 and 7990. Province of Benguet, Baguio, *A. D. E. Elmer*, n. 8844.

Scandent upon shrubs and forming more or less tangled bushes; stems soft, greenish, tough, the size of the small finger; leaves submembranous, flat, dull but darker green above; infrutescence axillary, spicate, hard and when collected reddish brown, 2 to 4 inches long, the spikes usually curved and opposite the leaves. On stream banks at Sablan and was called "Detid" by the native Igorot. (*Elmer*, ms. for n. 8844)

Piper villilimbum C. DC. sp. nov.

Foliis modice petiolatis ovato-ellipticis, basi breviter inaequilatera altero latere obtusis altero acutis, apice acute acuminatis, utrinque villosis, penninerviis, nervo centrali in mare a 1 cm. supra basin trifido nervosque adscendentes utrinque 2 paullo supra basin mittente, in femina nervos adscendentes utrinque 3 mittente quorum supremus fere a 3 cm. supra basin solutus; petiolo villoso basi ima vaginante; maris pedunculo tenuissimo villoso quam petiolus paullo breviore, spica juvenili quam folii limbus pluries breviore, bracteae glabrae pelta orbiculari centro pedicellata; feminae pedunculo tenuissimo villoso, petiolum paullo superante, spica folii limbum subaequante vel paullo superante, rhachi dense hirtella, bracteae glabrae pelta parva, rotunda centro subsessili, ovario libero glabro; stigmatibus 3 ovato-acuminatis brevibus, bacca matura subglobosa stipitem suum superante.

Dioicum, scandens. Ramuli densi villosi, spiciferi 1 mm. crassi, pili usque ad 2 mm. longi, collenchyma libriforme continuum, fasciculi intramedullares 1-seriati, canales lysigenes plures quorum unus centralis, alii peripherici. Limbi in sicco membranacei crebre pellucido-punctulati, superi usque ad 14 cm. longi et 4.5 cm. lati. Petioli usque ad limbi latus longius 10 mm., inter limbi latera 1 mm. longi. Limbi foliorum inferiorum minores, 4-6 cm. longi ovato-lanceolati basi inaequilatera cordulati, 7-plinervii. Spicae fem. 10 cm. longae rhachis 1 mm. crassa. Bracteae pelta 0.75 mm. diametro. Bacca 4 mm. longa.

Luzon, Province of Tayabas, Lucban, *A. D. E. Elmer*, ns. 7382 and 7624.

A lax and finely branched scandent shrub; the older stems rather wiry and thin; soft leaves paler beneath; infrutescence pendulous, deep red when mature. Not common in woods at 2500 feet of mount Banahao. (*Elmer* ms. for n. 7624)

Heckeria Hook.

Spicae in apice ramuli axillares subumbellatae vel axillares solitariae. Bractea libera. Flos hermaphroditus. Stamina 2-3. Ovarium liberum.

Piper umbellatum glabrum [B] C. DC. in Bull. Herb. Boiss. XVI; 494.

Mindanao, District of Davao, Todaya (Mt. Apo), *A. D. E. Elmer*, n. 10862.

Solitary or in clusters of very fertile soil of herbaceous thickets in damp places at 3000 feet; stems ascending, occasionally branched, nodulose every 10 inches, 1 inch thick yellowish green, lenticelled, 3 to 7 feet high; leaves scattered along the upper portion of the stems, limp, the basal portion deeply sunken on the upper side, the margins lopping or wavy, beneath much paler green; petioles whitish green, subterete, grooved on the upper side toward the base; inflorescence axillary, upon strict light green terete peduncles and pedicels, when old turning grayish green. "Cuyok" is the Bagobo name. (*Elmer* ms.)

LEAFLETS OF PHILIPPINE BOTANY

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THE FERNS OF MOUNT APO

BY

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According to the numerous moderately discrepant measurements, Apo is somewhat more than three thousand meters in altitude. The western face drains into the Rio Grande de Mindanao; this side of the mountain is entirely unknown to white men. Its eastern slope drains into the gulf of Davao, through the Sibulan river. Above the narrow coastal plain, the stream runs in a deep gorge. This is the usual route to the mountain, and for a considerable distance the traveller fights his way up the bed of the stream itself. At an altitude of five hundred meters, the gorge forks, where the Baruring and Sibulan meet. The Bagobo community of Todaya occupies the table land between these streams, just above their confluence, and about two hundred meters above their level. It extends back to an altitude of about twelve hundred meters, beyond which is a plateau covered with typical virgin rain forest. Below Todaya, the formation is high forest.

Following the Apo trail above Todaya some four kilometers, Mainit creek, named for its thermal springs, is reached. There is then a steep climb to Seriban creek, and a gra-

dual ascent along it to the locality known as Baclayan. I had a rest house built here in April, 1904, and a month or so later, *Major Mearns*, since *Mr. Roosevelt's* companion in Africa, had a second house built beside it. Ferns and moss cover their ruins. The mossy forest extends hardly five hundred meters above Baclayan, and then merges through a belt of elfin wood which is moss-covered or not, according to its exposure into a heath which covers the summit.

North of Todaya, and north-east of Apo is Mt. Calelan, a long-dead volcano, whose crater is probably about eight kilometer across, and at the nearest point about that distance from the summit of Apo. The points along its rim are two thousand and six hundred to two thousand and seven hundred and fifty meters high, and covered to the top with mossy forest. Apo itself is not a volcano.

The climate hardly changes in this region, in the mossy forest practically not at all. Above it, near the summit of Apo, I have found the blueberry bushes full of flower and of fruit in April and in October. In the low country the conditions are not so uniform, but even here a really dry season is rare. I have never spent a day at or above Todaya without rain.

Every botanical collector knows that he can make his richest collections on and about high mountains. Being the highest point in the Philippines, Apo has received several visits. The first of these was by *Koch* and *Schadenberg*, in 1882. *Montano*, with an official party, undertook an ascent two years ealier, but probably did not reach the summit, and seems to have collected no plants. The first considerable cellections in the neighborhood were made by *Warburg*, using Santa Cruz as a base. His mountain plants come from "Mt. Dagatpan," which I believe, but do not know, to be a spur of Apo, which ends in a sharp peak, about nine hundred meter high, near the coast. In 1903, a brief trip was made by two teachers, *DeVore* and *Hoover*, collecting plants for the St. Louis exposition. The writer spent two weeks in April, 1904, and again in October of the same year, at Todaya and in camp in the mossy forest at Baclayan, visiting the summit three times. On the second of these trips, the whole time was devoted to ferns. *Dr. Mearns* has made fine fern collec-

tions elsewhere, but did not on Apo, because I had just been there. In 1905, *Mr. R. S. Williams*, of the New York Botanical Gardens, made an extensive collection in the district of Davao, including a fair proportion at and above Todaya.

Mr. Elmer collected here from April to October, 1909, using Todaya as a base. He spent fifteen days at Baclayan in August, and a few days in September, making three trips to the summit. Six visits were made at different times to the summit of Mt. Calelan.

For several reasons it seems worth while, in connection with the study of this collection, to list all the species known to occur at any considerable altitude on the mountain mass of Apo and Calelan. The total number of these is more than two hundred and fifty. While exact data for a comparison are wanting, it is probable that this is the richest known fern flora in the world. *Raciborski*, in his *Pteridophyten* der Flora von Buitenzorg, takes up three hundred and fifty one species; but this includes a very considerable number merely "Aus Java angegeben," or whose known places of occurrence are fairly remote. The two hundred and fifty two here listed from the mountain do not include some dozens which have been collected in the neighboring coastal plain.

In speaking of the local distribution of these ferns, I must refer for general information and for the basis of comparison to my paper on the Comparative Ecology of San Ramon *Polypodiaceae*. The number of species known from the different étages is as follows:—

	Apo (*Filicineae*)	San Ramon (*Polypodiaceae*)
Alpine brush	5	0
Mossy forest	76	10
Rain forest	96	59
High forest	62	81

The species of the coast and Savanna woods are not taken into account here. If a fair proportion of attention had been given to the collecting in the high forest region about the base of Apo, it is safe to assume that it would have yielded a larger number of species than we have from the same type of environment at San Ramon, though not in the same proportion that the rain forest species are more numerous on Apo and Calelan.

The feeble development of the mossy forest above San Ramon made it impossible to bring out with proper force the most remarkable character of this vegetation. This is the fact that it is the region of the greatest development of xerophytes, in spite of its being the most of the time the most humid region. The prevailing humidity is conducive to the luxuriant development of epiphytes, and epiphytes have to be xerophytic, in one way or another, because when the air is temporarily dry they have no outside source of water. Like xerophytic vegetation in general, that of the mossy forest is of very slow growth and long-lived.

The endemism of the mossy forest is high, as is illustrated by the dominant group, *Eu-polypodium*. And still, considering that the mossy forest occurs only in small and usually widely separated spots, it is surprising how many of its peculiar species have a wide geographical range. *Monachosorum* and *Cheiropleuria* are examples of this; and as a generic case of the same kind, we have *Achrosorus*, extending apparently from Polynesia to the Malay Peninsula, but most of the species known each from a single mountain.

The known facts as to the geographical distribution of the Apo ferns may be summarized as follows:—

Local	33
Confined to Mindanao	5
Confined to the Philippines	43
Total endemic in the Philippines	81
Malayan species not passing Mindanao	14
Malayan species not reaching Luzon	21
Malayan species not passing Luzon	112
Malayan species not passing the Philippines	147
Malayan species not reaching Japan	7
Malayan species reaching Japan	17
Malayan species passing Japan	1
Total Malayan species passing Luzon	25
Species known beyond but not in Malaya	1
Northern species not reaching Malaya	0

This table illustrates, probably more strikingly than has been done before, the measure of independence of the Philippine fern flora, and the completeness of its ultimate dependence on the fern flora of Malaya. For long as is the endem-

ic list, every species in it has relatives to the south. Of the thirty species of *Dryopteris*, nineteen are Malayan, but not one passes Luzon. Of the twenty-six *Eu-polypodia*, seventeen are Malayan; not one passes Luzon, and only five pass Malaya in other directions.

Construing Malaya as extending from the Moluccas to Sumatra, one hundred and seventeen of the Apo ferns are known in Malaya and pass its boundaries in other directions Of these, seven are pantropic, and fifty-two pass Malaya both eastward and westward. Of the remainder, thirty are known to the east or south east; and twenty-eight to the west or north-west. These numbers are practically equal. But if I had tried to construe Malaya as excluding Celebes, affinity of the flora would have seemed to be overwhelmingly with the region to the east. So far as the testimony of ferns goes, *Wallace's* line has absolutely no reason for being imagined. I will add that I have recently had an opportunity to study a considerable collection from Papua, near the eastern end of New Guinea, and that its fern flora is as unmistakably Malayan in character as is that of the Philippines.

Enumeration of species.

OPHIOGLOSSACEÆ.

OPHIOGLOSSUM Linn.

Ophioglossum pedunculosum Desv.

In very moist, compact, black soil of the cogon grass formation, alt. 500 m., No. 11050. "Talinga."

Throughout the Philippines.

Japan to India and New Zealand.

Ophioglossum pendulum Linn.

Epiphytic in humid forest, Todaya, No. 11416. Mt. Apo. Mararag creek, alt. 1500 m., No. 11567. "Baroylatong." No. 11567 has the larger fronds almost 2 m. long, and the spikes up to 25 cm. in length.

Throughout the Philippines.
India to Australia and Hawaii.

BOTRYCHIUM Swartz.

Botrychium daucifolium Wall.

In dense forest, Mt. Apo, alt. 1500 m., *Copeland*.
Horn of Negros.
India to Java.

HELMINTHOSTACHYS Kaulf.

Helminthostachys zeylanica (L.) Hook.

Common at the foot of Apo, *Copeland* 461; *DeVore* and *Hoover* 99.
Throughout the Philippines.
Malaya to India, Formosa, and New Caledonia.

MARATTIACEÆ.

ANGIOPTERIS Hoffm.

Angiopteris angustifolia Presl.

On shady bank of Baracatan creek, alt. 600 m., No. 11907. "Manaba."
Throughout the Philippines.
Formosa to Annam and the Sunda Islands.

MARATTIA Swartz.

Marattia pellucida Presl.

On wall of gorge, Mt. Apo, alt. 1550 m., *Copeland* 1455.
Christ has also described from Mt. Apo, *M. vestita* based on *Copeland* 1179. The two specimens look unlike, but I believe they grew on one plant.

Luzon, Babuyanes Islands.
New Caledonia.

CHRISTENSENIA Maxon.

Christensenia Cumingii Christ.

In moist, fertile soil near streams, Todaya, alt. 900 m., No. 11275. "Baliotus." Rare everywhere.
Mindanao, Negros, Luzon.

OSMUNDACEÆ.

OSMUNDA Linn.

Osmunda banksiifolia (Pr.) Kuhn.

Dense clumps along Baruing river, alt. 1200 m., No. 11629. "Libagod."
Mindanao, Negros, Luzon.
Moluccas to Kamtschatka.

SCHIZAEACEÆ.

LYGODIUM Swartz.

Lygodium circinnatum (Burm.) Swtz.

Copeland 336, *Williams* 2820.

Lygodium japonicum (Thunb.) Swtz.

DeVore and *Hoover* 243, *Copeland*.

Lygodium scandens (L.) Swtz.

Copeland 431.
All of the above species grow about the foot of Apo and throughout the Philippines, and are wide spread in this part of the world.

GLEICHENIACEÆ.

GLEICHENIA Smith.

Gleichenia vulcanica Bl.

On mossy soil, logs and roots, Mt. Calelan, alt. 2150 m., No. 10626; Mt. Apo, alt. 2500 m., No. 11388. The pinnae of Calelan specimens reach a length of 30 cm., and are decidedly glaucous beneath. On the exposed summit of Apo, the plants are much more dwarfed.

Mts. Apo, Malindang, Halcon.

Java, Celebes.

Gleichenia hirta Bl.

Mt. Calelan, alt. 1450 m., No. 10909. "Tangiras." Stipes 1 to 3 m. long.

Northward to Benguet.

Moluccas, Java.

Gleichenia laevigata (Willd.) Hook.

Todaya, alt. 1000 m., No. 11604. "Lagsam." Sometimes forming thickets.

Northward to central Luzon.

Malaya.

Gleichenia crassifolia (Pr.) Copel.

On cliffs along Seriban creek, alt. 2600 m., No. 11391. "Tangiras." I know this fern from Mt. Apo and Mt. Canloan only, but it exactly fits *Presl's* description based on Luzon specimens.

Gleichenia sordida Copel. spec. nova.

Species gregis G. japonicae Spr. qua pinnulis stipitatis facile distincta. Rhachidibus, et rhachidem versus costis pinnarum, paleis parvis sordido-castaneis dense vestitis; pinnulis vix 20 cm. longis, 3 cm. latis, acutis; segmentis proximis,

integris, infimis non vel solummodo uno latere diminutis, glabris, coriaceis, planis, infra pallidis non glaucis; venulis furcatis.

Mt. Apo, alt. 1350 m., No. 11423[a].

While most readily recognized by its stalked pinnae, this species differs from any others known to me in the closeness and uniformity of the paleae of the rhachises and lower part of the costae, on both surfaces but especially above.

Gleichenia Elmeri Copel. spec. nova.

Species altera gregis G. japonicae Spr. ob segmenta remota distinctissima. Rhachi scandente usque 12 m. alta, ultra 1 cm. (teste *Elmer*) crassa; pinnis fere 1 m. inter se distantibus, 150 cm. longis, recurvis, sessilibus, rhachidibus fere glabris, castaneis, nitidis; pinnulis infimis stipulaceis, aliis brevi-pedicellatis, maximis ultra 25 cm. longis, acuminatis; segmentis remotis, deorsum 5 mm. inter se distantibus, infimis interdum paullo diminutis, linearibus, rectis vel curvis, integris vel rarius crenatis, coriaceis, infra arachnoideo-paleaceis et pallidioribus, ala angusta connexis; soris paginam totam fere complentibus, sporangiis 4-7.

Mt. Apo, in very damp woods, alt. 1650 m., No. 11423. "Tangiras."

From the lowest segment, the wing runs down onto the rhachis, on which, entirely losing its foliaceous character, it forms a pronounced ridge.

The Bagobos use the stipes and rhachises for tieing and weaving. Related species are used in the Philippines for decorative purposes, such as making light picture frames, for which the rich color and shiny surface fits them well, and, at least in an experimental way, for hat making. The most important ferns in this respect are, however, the *Lygodia*. These and the climbing stems of *Stenochlaena* are articles of commerce in various parts of the Islands. The *Stenochlaena* has diverse uses, including the calking of boats.

HYMENOPHYLLACEÆ.

HYMENOPHYLLUM Smith.

Hymenophyllum formosum Brack.

On tree-fern trunks, Mt. Apo, alt. 1750 m., No. 11517. "Sogalob."

Horn of Negros.

Malaya to Polynesia and New Zealand.

Hymenophyllum demissum Swtz.

On mossy logs in humid forest, Mt. Apo, alt. 1200 m., No. 11803. "Dumadagli." Rare.

Mindoro, Luzon.

Malaya to Polynesia and New Zealand.

Hymenophyllum Junghuhnii v. d. B.

Mt. Calelan, alt. 1200 m., No. 11803[a]; mixed with the preceding.

Mindanao, Negros, Luzon.

Java.

Hymenophyllum australe Willd.

On mossy logs and trunks, Mt. Calelan, alt. 1200 m., No. 11799. "Domauit." Much more finely crisped than usual, and with larger sori.

Throughout the Philippines.

Japan to India and New Zealand.

Hymenophyllum blumeanum Spr.

On sheltered cliffs over the Baruring river, alt. 900 m., No. 10730. "Lomat."

Mindanao, Luzon (Mt. Mariveles), Batanes Islands.

Malaya, Ceylon.

Hymenophyllum tunbridgense Sm.

On mossy trunks, near the ground, Mt. Calelan, alt. 2600 m., No. 11690. "Lomat."

Horn of Negros, Mt. Halcon.
England to New Zealand and Chile.

Hymenophyllum serrulatum (Pr.) C. Chr.

On mossy trees, Mt. Apo, alt. 1450 m., *Copeland* 996.
Negros, Luzon.
New Guinea.

Hymenophyllum sp.

On mossy trunks, Mt. Apo, alt. 1850 m., *Copeland* 1053. This is a mixture, in part apparently *H. polyanthos Swtz.*, and for the rest probably new.

TRICHOMANES Linn.

Trichomanes gemmatum J. Sm.

Mt. Calelan, No. 11355; Mt. Apo, alt. 1900 m., *Copeland* 1054.
Northward to central Luzon.
Malaya, New Guinea.

Trichomanes apiifolium Pr.

Mt. Calelan, alt. 1400 m., No. 1180 3^b. Rather common in the mossy forest.
Throughout the Philippines.
Java.

Trichomanes maximum Bl.

On a cut bank, Mt. Apo, *Williams* 2495.
Throughout the Philippines.
Malaya to Queensland and Polynesia.

Trichomanes cupressoides Desv.

On rocks in mossy forest, Mt. Apo, alt. 1800 m., *Copeland* 1109.
Throughout the Philippines.

Malaya to India and Madagascar.

Trichomanes auriculatum Bl.

In very dense, moist forest, Mt. Calelan, alt. 1350 m., No. 11865. "Salampoyan."

Mindanao, central Luzon.

India to Japan and New Guinea.

Trichomanes pallidum Bl.

Epiphytic on sheltered sides of trunks, Mt. Calelan, alt. 2150 to 2450 m., No. 11675. Sterile; with the fronds, stipes included, reaching a length of 40 cm.

Northward to Mt. Pinatubo, Luzon.

India to Polynesia.

CYATHEACEÆ.

CYATHEA Smith.

Cyathea atropurpurea Copel. in P. J. S. 3, C (1908) 354.

In moist forest on ridge, alt. 1050 m., No. 11250. "Notong." Trunk 1 to 3 m. high, 5 cm. thick; frond 1.5 to 2 m. long.

Mindoro, Luzon (Cagayan province.)

Cyathea tripinnata Copel. in P. J. S. 1, Suppl. (1906) 251.

In dense forest south of Baruring river, alt. 1200 m., No. 10915. "Notong." Trunk 3 m. high, 15 cm. thick. The secondary pinnules are shorter than in the type (at most 12 mm. long), in this respect approaching *C. arachnoidea Hook.*

Negros, Mindoro, Luzon.

Cyathea apoensis Copel. spec. nova.

Trunco gracile, ca. 5 m. alto, 7.5 cm. crasso; frondibus

250 cm. altis, patentibus; stipite breve, 2.5 cm. crasso; paleis griseo-ochroleucis vestito; rhachi castanea minute tuberculata, glabrescente, apud baseos pinnarum aerophoris solitariis praedita; pinnis sessilibus, maximis 40 cm. longis, rhachi infra subglabrescente; pinnulis sessilibus, maximis 5 cm. longis, costis supra hirsutis, infra paleis nitidis castaneis pallidomarginatis lanceolatis acuminatis praecipue versus rhacheos, et aliis minutis ovatis vestitis; pinnulis[11] inferioribus liberis, 7 mm. longis, vix 2 mm. latis, supra mediam serratis, obtusis, subcoriaceis; venulis utroque latere 6-7, quarum ca. 4 furcatis; soris costularibus; indusio globoso, 0.7 mm. lato, mox ore regulare aperto, membranaceo, persistente, plerumque demum fisso.

In dense woods along Seriban creek, Mt. Apo, alt. 1800 m., No. 11482. "Notong."

This species has some striking characters in common with *C. zollingeriana Mett.* and with *C. orientalis Moore.* It is not very much like any previously known Philippine species, but suggests *C. lanaensis Christ* as much as any.

Cyathea heterochlamydea Copel. in *Elmer's* Leaflets 2 (1908) 418.

In dense woods, alt. 1200 m., No. 11634. "Notong." Trunk 6 m. or more high, stout; fronds more than 2 m. long.

Horn of Negros.

Cyathea Christii Copel. in P. J. S. 1, Suppl. (1906) 114.

In dense forest at foot of Mt. Calelan, alt. 1200 m., No. 10601. This collection is fairly typical. No. 11459 from Mt. Apo, alt. 2000 m. is a plant with trunk 5 m. or more high, but very reduced foliage, which I cannot distinguish by valid characters from *C. christii.*

Mindanao.

Cyathea Elmeri Copel. in P. J. S. 4, C (1909) 54.

In moist woods at foot of Mt. Calelan, alt. 1200 m., No. 10585. Trunk 5 to 8 m. high, 10 cm. thick; fronds 3 m. long. There is an evident rudimentary indusium, which I am unable to detect on the type collection.

Horn of Negros.

Cyathea bicolor Copel. spec. nova.

Trunco 6-9 m. alto, ca. 10 cm. crasso; stipitibus subnullis patentibus 2.5 cm. crassis, paleis brunneis vestitis, infra spinulosis; frond horizontale, 180-275 cm. longa, rhachi brunnea infra minute verrucosa et mox glabrescente; pinnis infimis valde reductis, deflexis; pinnis maximis 50 cm. longis, 20 cm. latis, subsessilibus, in apices acuminatas abrupte contractis, rhachidibus infra minute asperulis, deinde glabrescentibus, supra velutinis; pinnulis subsessilibus, 10 cm. longis 2 cm. latis, acuminatis, pinnatis, costa supra velutina atropurpurea, infra paleis lanceolatis et ovatis usque ad 2 mm. longis rufis integris, et aliis minoribus concoloribus amorphis vestita; pinnulis[11] pinnularum majorum plurimis liberis, 10-12 mm. longis, plus minus falcatis, acutis, ubique serratis vel fere integris, supra atroviridibus, infra pallidis et nisi versus baseos costularum glabris, coriaceis; venulis utroque latere 10-12, furcatis; soris strictissime costularibus, receptaculo alto, indusio rudimentario.

In dense forest, Mt. Calelan, alt. 2150 m., No. 11353 (type); Mt. Apo, alt. 2000 m., No. 11458. "Notong."

This suggests the common *C. caudata* (*J. Sm.*) of Luzon, more than any other species; it is most easily distinguished by the pubescence, the diverse paleae being persistent on the costa, and some of them also on the costules and rhachises of the pinnae. *C. javanica* is another species somewhat similar in general appearance.

Cyathea contaminans (Wall.) Copel. in P. J. S. 4, C (1909) 60.

Along Sibulan river, alt. 900 m., No. 11770. "Notong." Trunk 9 m. high, frond up to 450 cm. long. The secondary pinnules are acute and up to 22 mm. long.

Throughout the Philippines.

Malaya, India.

DICKSONIA L'Her.

Dicksonia Blumei (Kze.) Moore.

On high, wooded ridges, alt. 2150 m., Mt. Calelan, No.

10640; Mt. Apo, No. 11452. "Notong." Trunk 1 to 5 m. high.

Mindanao, Negros, Mindoro.

Java, Celebes.

POLYPODIACEÆ.

DRYOPTERIS Adan.

Dryopteris tenerrima Copel. in P. J. S. 4, C (1909) 111.

Small succulent tufts on wet ledges along Cati creek, alt. 1750 m., No. 11552. "Manaba."

Mt. Banajao.

Dryopteris dura Copel. spec. nova.

Caudice erecto, breve; stipitibus confertis, adscendentibus, rigidis, atropurpureis, apud basin paleis atropurpureis falcatis acuminatis late lanceolatis vestitis, sursum glabris; fronde lanceolata, acuminata, deorsum angustata, ca. 25 cm. alta, 4-8 cm. lata, subbipinnata, rhachide stramineo-purpurea, sparsissime paleacea, aliter infra glabra, supra dense pubescente; pinnis inferioribus deflexis diminutis breve stipitatis, sequentibus sessilibus, lanceolatis, acutis, minute ciliatis, costa supra pubescente excepta aliter glabris, rigidis, 0.5 ad costam pinnatifidis et rhachin versus profundius incisis, segmento infimo acroscopico interdum libero, segmentis rotundatis, integris; venis pinnatis, venulis simplicibus; soris costalibus, indusiis persistentibus variiformibus.

In moss on tree trunks, Mt. Calelan, alt. 2600 m., No. 11674. "Libagod."

This plant has no near relatives known to me, and even its place in *Dryopteris* is not above doubt. The indusium is usually reniform; but some smaller ones are athyrioid.

Dryopteris syrmatica (Willd.) O. K. var. **petiolosa Christ.**

In rich soil along streamlets, alt. 450 m., No. 11109. "Saladot."

This variety in Mindanao and Luzon.
The species, Malaya to India and the Philippines.

Dryopteris metteniana Hieron. by *Christ* in P. J. S. 2, C (1907) 210, not *O. K.*

In dense woods, Todaya, alt. 850 m., to 1200 m. Nos. 10789 and 11623. "Libagod." Rootstock rigid, 2.5 cm. thick, short, somewhat creeping. On the relation to *D. syrmatica*, see these Leaflets 2 (1908) 390.
Mindanao, Negros, Luzon.
Celebes.

Dryopteris hirtipes (Bl.) O. K.

In wet soil in heavy woods, Mt. Calelan, alt. 1350 m., No. 10799. "Sayop-saka." Collected by myself at 1800 m. alt. on Mt. Apo.
The Benguet highland.
Malaya to India, China and Polynesia.

Dryopteris rizalensis Christ in P. J. S. 3, C (1907) 216.

Todaya, in damp gorge, alt. 850 m., No. 10807.[a] This is the type locality.
Known also from San Ramon, and from Rizal province, Luzon.

Dryopteris dissecta (Forst.) O. K.

Terrestrial in forest, Mt. Apo, alt. 1200 m., *Copeland* 1465.[a]
Throughout the Philippines.
Malaya to Madagascar, India and Polynesia.

Dryopteris sp. near **D. dissecta.**

Terrestrial in dense forests, alt. 1050 m., No. 11741. "Danganrisman." This is probably a new species.

Dryopteris setigera (Bl.) O. K.

Mt. Apo, *DeVore* and *Hoover* 360, 361.
Both labels give the altitude as 2500 m., surely in error.

The fern is very common at the foot of the mountain.

Common throughout the Philippines.

Malaya, China.

Hypolepis tenerifrons Christ in P. J. S. 3, C (1908) 274.

Clumps on sandy soil, Mt. Apo, alt. 1800 m., No. 11486. "Natong." "Rootstock a few inches long, one or two inches thick." Collected here previously by *Copeland* 1462, and *Williams* 2491. I do not regard this plant as *Hypolepis*, but rather as *Dryopteris*, but am not ready to transfer it.

Mt. Halcon.

Dryopteris sagenoides (Mett.) O. K.

On canyon wall, Todaya, alt. 850 m., *Copeland* 1238. "Libagod."

Mindanao, Leyte.

Malaya, Birma.

Dryopteris purpurascens (Bl.) Christ in P. J. S. 2, C (1907) 213.

Terrestrial on a mossy ridge, Mt. Burebid, alt. 1500 m., No. 11842. "Notong." "Rootstock suberect, several inches long, one inch thick."

Mt. Halcon.

Malaya.

Dryopteris subarborea (Bak.) C. Chr. by *Christ* in P. J. S. 2, C (1907) 214.

On bowlders, ledges and mossy trunks, Mt. Apo, alt. 1700 m., Nos. 11418 and 11550. "Libagod" and "Tarugi."

Mindanao, Benguet (teste *Christ.*)

Malaya.

Dryopteris gymnocarpa Copel. spec. nova.

Rhizomate breve, repente, ca. 1.5 mm. craso; stipitibus confertis, ca. 2 cm. altis, deorsum paleaceis, ubique rhachique pilis albidis ca. 0.7 mm. longis dense setosis; fronde usque

ad 15 cm. alta, lanceolata, acuminata, deorsum pinnata, sursum pinnatifida; segmentis fere integris, pinnis dentatis, vel infimis remotis brevi-pedicellatis lobatis, obtusis, venulis marginibusque setosis, aliter glabris; venulis furcatis, liberis; soris elongatis, nudis; sporangiis atrobrunneis, rarissime seta ornatis; sporis verrucosis.

Mt. Apo, at falls of Cati creek, alt. 1750 m., No. 11508.

This little fern suggests *D. africana* (*Desv.*) *C. Chr.* and *D. philippina* (*Presl*) *C. Chr.*, the latter of which is identical with *D. aoristisora* (*Harr.*) *C. Chr. D. gymnocarpa* is superficially enough like *Athyrium grammitoides* (*Presl*) readily to permit confusing them.

Dryopteris calva Copel. spec. nova.

Species gregis *D. gracilescentis*, costis infra glabris, soris costulae quam margini propioribus, *D. gracilescente* haud aliter distinguenda.

Gravelly soil along Seriban creek, Mt. Apo, alt. 1800 m., No. 11485. "Pacat-pang-pang."

This is so near to *D. gracilescens* (*Bl.*) *O. K.* as to be readily mistaken for it. However, in the seven collections of that species which I have from various parts of its range, there is not a specimen the costae of whose pinnae are not conspicuously hairy beneath, nor whose sori are as close to the costule as those of *D. calva*. The surface of *D. calva* is not at all glandular, but I find *D. gracilescens* somewhat variable in this respect.

Dryopteris Foxii (Copel.) Christ in P. J. S. 2, C (1907) 208.

In wet rock crevices by Sibulan river, alt. 900 m., No. 10832. "Libagod."

Throughout the Philippines, on rocks submerged by floods.

Dryopteris viscosa (J. Sm.) O. K.

Terrestrial in mossy forest, Mt. Calelan, alt. 2350 m., No. 11354. "Saladat." Collected also at 1800 m. alt. on Mt. Apo by *DeVore* and *Hoover* and myself. This Apo form is very small and only obscurely glandular.

Northward to central Luzon.
Westward to Sumatra.

Dryopteris Beddomei (Bak.) O. K.

In very moist places along the Cati creek, Mt. Apo, alt. 1800 m., Nos. 11520 and 11592. "Libagod."

Common in the Benguet highlands; this is the first collection elsewhere in the Philippines.

Java to southern India and China.

Dryopteris immersa (Bl.) O. K.

Terrestrial in very moist soil, along Baruring river, alt. 900 m., No. 10805. "Libagod." "Rootstock erect, a few inches thick and half a foot high." Fronds very ample.

Mindanao, central Luzon.
Malaya.

Dryopteris hispidula (Dcne.) O. K. or near it.

In wet, sandy soil along Cati creek, alt. 1800 m., No. 11552. "Paco." This is a very small form and has the lower pinnae gradually reduced, and the margin strongly ciliate. But for the dead persistent bases of stipes belonging to larger fronds than are present, I would consider this a new species.

Mindoro, Luzon.
Malaya, New Guinea, Samoa.

Dryopteris megaphylla (Mett.) C. Chr.

On canyon wall, Todaya, alt. 800 m., *Copeland* 1236.
Northward to central Luzon.
Malaya.

Dryopteris adenophora C. Chr.

No. 11657 (notes missing.)
Throughout the Philippines.
Celebes.

Dryopteris todayensis Christ in P. J. S. 2, C (1907) 193.

Dense clumps in humid forested flats, alt. 900 m., No. 11916. "Libagod."

This is the type locality; it is known also from Negros and Mindoro.

Dryopteris unita (L.) O. K.

"Mt. Apo", *De Vore* and *Hoover* 378. Very common in the low country of Davao.

Throughout the Philippines.

India to Polynesia.

Dryopteris pteroides (Retz.) O. K.

Along streamlets in woods, alt. 450 m., No. 11111. "Libagod." Rhizome horizontal.

Throughout the Philippines.

Malaya to China, Queensland and Polynesia.

Dryopteris urophylla (Wall.) C. Chr.

In rather dry places in bamboo region, alt. 850 m., No. 11766. "Sayop."

Mindanao, Luzon (?)

India and China to Polynesia.

Dryopteris moulmeinensis (Bedd.) C. Chr.

In wooded ravines, alt. 500 m., No. 10972. "Libagod."

The name given me by the Bagobos for this fern was "Sayop." The indusia are evident.

Mindanao, Mindoro.

Malaya to India and Fiji.

Dryopteris Spenceri Christ in P. J. S. 2, C (1907) 206.

On dry, mossy, sheltered surface of bowlders, alt. 850 m., No. 11723. "Libogod."

Known only from this locality.

D. canescens (Bl.) C. Chr. var. **subsimplicifolia Christ** in P. J. S. 2, C (1907) 199.

On wet, mossy rocks, alt. 1150 m., No. 10784. "Sayop." Tayabas province, Luzon.

Dryopteris diversiloba (Pr.) Christ in P. J. S. 2, C (1907) 199.

On moist, mossy soil in forests, alt. 1050 m., No. 10780. "Sayop." This form is *Goniopteris asymmetrica Fée.*

Fairly common in Mindanao, and collected once each in Negros and La Laguna province, Luzon, near the Pacific coast.

POLYSTICHUM Roth.

Polystichum aculeatum (L.) Schott.

Creeping on tree trunks near the ground, in dense woods, Mt. Calelan, alt. 1200 m., No. 11802. "Dumagindo." The same form has been collected on Mt. Apo by *Williams* 2511, and myself, and at Camp Keithley by *Mrs. Clemens.* It is not *P. horizontale Presl*, nor any other form known to me.

Polystichum aristatum (Forst.) Presl.

Mt. Calelan, No. 11614.[a] Several Philippine species are confused under *P. aristatum* and *P. carvifolium.*

Natal to Japan and Polynesia.

Polystichum amabile (Bl.) J. Sm.

Mixed with the preceding. Also collected on Mt. Apo, alt. 1800 m., *Copeland* 1114.

Throughout the Philippines.

Malaya to India and Japan.

DIDYMOCHLAENA Desv.

Didymochlaena truncatula (Swtz.) J. Sm.

In dense forests, alt. 1200 m., No. 10917. "Libagod."

Northward to Mt. Banajao.

Tropics.

TECTARIA Cav.

Tectaria decurrens (Pr.) Copel.

Along Baruring river, alt. 850 m., No. 10792. "Libagod-ta-saka." Caudex erect, 2.5 to 5 cm. thick, 15 cm. high.
Throughout the Philippines.
India and China to Polynesia.

Tectaria polymorpha (Wall.) Copel. in P. J. S. 2, C (1907) 413.

On wet cliff by Sibulan river, alt. 400 m., *Copeland* 1311, 1466.
Northward to central Luzon.
Malaya to India.

Tectaria crenata Cav.

Along Baracatan creek, alt. 550 m., No. 10966. "Libagod." Fertile fronds only. This form is *Aspidium persoriferum Copel.*, and this is its type locality.
Throughout the Philippines.
Malaya and New Guinea.

Tectaria ambigua (Pr.) Copel.

In dense woods, Todaya, alt. 1200 m., No. 11622. "Marapingan." Caudex erect, 30 cm. high, 5 cm. thick. Also alt. 850 m., No. 10807. "Libagod." Dimorphism not very marked. This is *A. profereoides Christ*, topotypic.
Known also from Samar and Mindoro.

Tectaria devexa (Kze.) Copel.

On rocks in forest, foot of Mt. Calelan, *Copeland* 898.
"Philippines", *Cuming*.
Malaya to Ceylon, China and Formosa.

Tectaria melanocaulon (Bl.) Copel.

Mt. Apo, alt. 1200 m., *Copeland* 1466.[a]
Mindanao, Negros, central Luzon.
Malaya to China and New Guinea.

Tectaria malayensis (Christ) Copel.

In deep forest south of Baruring river, alt. 1050 m., No. 11742. "Orogauai." Caudex 30 cm. high, about 8 cm. thick.

Throughout the Philippines.

Tectaria leuzeana (Gaud.) Copel.

No. 10682; the giant form, called *A. angilogense Christ*, Todaya, alt. 1150 m., in moist soil of dense woods. "Alabungan." Caudex 30 cm. high, 20 cm. thick; frond 3 m. long. Also No. 10547; the small form, in moist woods, alt. 1250 m., with fronds 60 to 200 cm. long.

Throughout the Philippines.

India and China to Polynesia.

STENOSEMIA Presl.

Stenosemia aurita (Swtz.) Presl.

At foot of Mt. Calelan, *Copeland* 957.

Mindanao, Jolo, Luzon.

Malaya, Solomon Islands.

LEPTOCHILUS Kaulf.

Leptochilus heteroclitus (Pr.) C. Chr.

On mossy rocks in stream bed, near Sibulan river, alt. 500 m., No. 11209. "Libagod."

Common throughout the Philippines.

India to Melenesia.

Leptochilus lanceolatus Fée.

On rocks at edge of river, Catalonan, *Copeland* 923.

Mindanao, central Luzon.

"Tropical Asia."

DIPTERIS Reinw.

Dipteris conjugata Reinw.

In edges of chaparral, Mt. Apo, alt. 2500 m., *Copeland* 1469. This form is the variety *alpina Christ.* The ordinary form is found at lesser altitudes.

Throughout the Philippines (the species.)

Asia to Polynesia.

ATHYRIUM Roth.

Athyrium grammitoides (Pr.) Milde.

In crevices in cliffs, Sibulan river, alt. 900 m., No. 10833. "Libagod."

Common throughout the Philippines.

Athyrium platyphyllum Copel. in P. J. S. 3, C (1908) 292.

On a dry, forested ridge, Mt. Calelan, alt. 1800 m., No. 11806. This is not exactly the typical *A. platyphyllum* of the Benguet highlands, but is very near it. This form has been found on Malindang and apparently on Mt. Banajao.

Endemic.

Athyrium "cyatheaefolium" (Rich.) Milde.

In dense forest, Mt. Calelan, alt. 1800 m., No. 11807. "Libagod." Two or three Philippine ferns are known by this name. The range of any one of them is in doubt.

Athyrium woodwardioides (Pr.) Christ.

In dense woods south of Baruring river, alt. 1050 m., No. 10680. "Dalabungan." Caudex 5 cm. thick, 1 to 1.5 m. high or long, erect or reclining. This fern is in its whole aspect more delicate than *A. silvaticum (Bl.) Milde*, as the latter is represented here by Javan specimens.

Mts. Apo and Banajao.

Athyrium macrosorum Copel. spec. nova.

Stipitibus teste *Elmer* ca. 3 confertis, 60-150 cm. altis, superne sulcatis, pedes versus nigris, sursum viridibus; fronde stipiti aequilonga, subdeltoidea, tripinnatifida, rhachidibus brunneo-stramineis, in alis pubescentibus, a liter glabris; pinnis longi-stipitatis, usque ad 50 cm. longis sed maximis plerumque ca. 40 cm. longis; pinnulis brevi-pedicellatis, usque ad 15 cm. longis, 25 mm. latis, acuminatis, glabris, herbaceis, infra paullo pallidioribus; venulis simplicibus; soris subcurvis, linearibus, 2-3 mm. longis; indusio angusto.

Mt. Apo, by Mararag creek, alt. 1500 m., No. 11569. "Pacoo."

In appearance this suggests *A. silvaticum* (*Bl.*) *Milde*, but the sori are very different.

Athyrium costulisorum Copel. spec. nova.

Stipitibus teste *Elmer* 3-5 confertis, ultra 1 m. altis, viridibus, infra brunneo-maculatis, glabris, basibus nigris, marginibus intumescentibus albis ornatis; fronde plus quam 1 m. alta, tripinnata; pinnis horizontalibus, oppositis, maximis plus quam 50 cm. longis, sessilibus, acuminatis, rhachidibus mox glabrescentibus; pinnulis usque ad 11 cm. longis, subsessilibus, acuminatis, rhachidibus supra canaliculatis, infra pube rufa sordida crinita persistente vestitis; pinnulis[11] utroque latere ca. 20, usque ad 13 mm. longis, 4 mm. latis, infimis vix adnatis, obtusis, serratis vel inciso-serratis, lamina glabra, venis infra pubescentibus, utroque latere 7-10, furcatis; soris brevibus, indusiis rudimentariis mox evanescentibus.

On ledges along Cati creek, Mt. Apo, alt. 1750 m., No. 11515. The Bagobo name in *Mr. Elmer's* notes means "Tree-fern by the river."

A species of the *Brachysorus* group.

Athyrium Blumei (Bergm.) Copel.

In creek-bank soil, Mt. Apo, alt. 1750 m., No. 11514. Caudex erect, 30 cm. high, stout.

Common throughout the Philippines.
India to Australia.

Athyrium fructuosum Copel. in P. J. S. 3, C (1908) 294.

In dense woods along creek, Mt. Apo, alt. 1800 m., No. 11483. "Natong." The lobes are relatively deeper and narrower than in typical specimens.

San Ramon, Mt. Mariveles.

Athyrium davaoense Copel. in P. J. S. 3, C (1908) 295.

In dense forest, foot of Calelan, alt. 1200 m., No. 10586. "Lalobungan." And south of Baruring river, alt. 1050 m., No. 11127. Caudex 30 cm. high, 10 cm. thick; frond 1.5 m. high.

Hitherto known only from the original collection made by myself at 1800 m. alt. on Mt. Apo.

Athyrium meyenianum (Pr.) Milde.

In ravines near Baruring river, alt. 750 m., No. 10788. "Libagod."

Throughout the Philippines, but common only in Mindanao.

Athyrium sorsogonense (Pr.) Milde.

On a dry, forested ridge, Mt. Calelan, alt. 1850 m., "Gaganan." These are the most ample and most serrate specimens of this species which I have seen.

Northward to southern Luzon and Mindoro.
Malaya, India.

Athyrium geophilum Copel. in *Elmer's* Leaflets 2 (1908) 399.

On mossy bowlders in a deep ravine, Mt. Apo, alt. 1800 m., No. 11433. "Salimpongog."

This is decidedly more dwarfed than the type collection from the Horn of Negros.

Athyrium pinnatum (Blco.) Copel.

In woods by a creek, alt. 450 m., No. 10871. "Libagod."
Northward to central Luzon.
India to Polynesia.

Athyrium pallidum (Bl.) Milde.

In dense forest, Todaya, alt. 1200 m., No. 11325. "Libagod."
Northward to central Luzon.
Malaya, Queensland.

Athyrium accedens (Bl.) Milde.

In moist soil, by a wooded creek, alt. 450 m., No. 10970. "Libagod."
Northward to Mindoro.
Africa to Polynesia.

Athyrium palauanense Copel. var. **apoense Copel.** var. nova.

Pinnis plerisque pedicellatis, basi truncatis, serrulatis, rhachi prolifera.

In dense forest, Todaya, alt. 1200 m., No. 11319; Mainit creek, No. 11720; ibidem, *Williams* 2465. Some specimens are bipinnate.

Athyrium fraxinifolium (Pr.) Milde.

In dense forest south of Baruring river, alt. 1150 m., No. 11745. "Libagod." Not typical, the pinnae being thin and serrulate.
Throughout the Philippines.
Malaya to India and Japan.

Athyrium tabacinum Copel.

A single specimen mixed with *A. cordifolium.* This is the type locality. Mt. Calelan, alt. 1500 m., No. 10911.[a]
Mt. Apo, Horn of Negros, Mt. Halcon.

Athyrium pariens Copel.

In dense forest, Mt. Calelan, alt. 1200 m., No. 11609.

"Baliotus."

Mt. Apo (type locality), Horn of Negros.

Athyrium cordifolium (Bl.) Copel.

On a ridge in dense woods, Mt. Calelan, alt. 1500 m., No. 10911. "Barawitana." Also at alt. 1200 m., No. 11609.[a]

Northward to central Luzon.

BLECHNUM Linn.

Blechnum orientale Linn.

On a lightly wooded ridge, alt. 900 m., No. 11780. "Libagod."

Common in not too shady places throughout the Philippines.

India to Australia and Polynesia.

Blechnum egregium Copel.

In ravine of Baruring river, alt. 1150 m., No. 11632. "Patugo." This is the type locality. If the species is a good one, it is unknown outside the Philippines.

Mindanao, Negros, Mindoro, central Luzon.

Blechnum Patersoni (R. Br.) Mett. (*Lomaria elongata Bl.*)

Collected on Mt. Apo at 1500 to 2000 m. by *Copeland* 1508, and *Williams* 2473.

Negros, Mindoro, Luzon.

India to New Zealand.

Blechnum vestitum (Bl.) Kuhn.

In rocky ravines, Mt. Apo, alt. 2450 m., No. 11530. "Manaba."

Already known from Apo, the Horn of Negros, Halcon and Mayon.

Malaya.

ASPLENIUM Linn.

Asplenium ellipticum (Fée) Copel. comb. nova. (*Neottiopteris elleptica Fée.* Genera 203. *A. musaefolium Mett.*)

Todaya, alt. 1100 m., *Copeland* 1296, 1261.

This is described by *Mettenius* as from Luzon. We have unnumbered specimens from *Cuming's* collection, which are like the common Mindanao fern, and exactly fit *Mettenius'* description; bud their origin is given merely as "Philippines." We have some similar specimens of recent collection in Luzon, but nothing quite identical. *Neottiopteris musaefolia J. Sm.* nomen nudum is *Christ's A. cymbifolium.* I have no description of *A. ficifolium Goldm.*, but as *Cuming's* numbered plant is *A. cymbifolium*, I am disposed to believe that this is *Goldmann's* plant. The different species of this group have been so thoroughly confused that little confidence can be put in citations in synonymy. There is also *N. stenocarpa Fée*, reduced to *A. musaefolium* by *Mettenius;* but it is described as having the fronds "obtusiusculis" and being comparetively small.

Asplenium Phyllitidis Don (?)

In clusters, hardly forming nests, Todaya, alt. 1200 m., *Copeland* 1291, 1507. This form, found also elsewhere in Mindanao, is much larger than are specimens from Negros and Luzon, determined as the same species.

Asplenium squamulatum Bl.

Mt. Apo, alt. 1200 to 1650 m., *Copeland* 1201, 1496.[a] *Copeland* 1288 from Todaya, alt. 1000 m., is hardly identical.

Mindanao, Luzon.

Malaya.

Asplenium apoense Copel.

Mt. Apo. alt. 1800 m., *Copeland* 1496. Perhaps only a very narrow form of *A. squamulatum.* Still another peculiar form is *DeVore* and *Hoover* 392, from Mt. Apo. The type

locality of *A. epiphyticum Copel.* is in this neighborhood.

Asplenium scolopendrioides J. Sm.

Climbing on small stems in dense woods, Todaya, alt. 1000 m.

Mindoro, Luzon.

Asplenium unilaterale Lam.

On mossy rocks in creek bed, alt. 1150 m., No. 10767. "Ranowan."

Throughout the Philippines, Africa to Japan and Polynesia.

Asplenium filipes Copel. in P. J. S. 3, C (1908) 34.

On wet, mossy ledges, Cati creek, alt. 1750 m., No. 11549. "Aragnat." No. 11798 is a large form, possibly too near to *A. unilaterale*, Mt. Calelan, alt. 1350 m. "Lagodo."

Mts. Canlaon and Mariveles.

Asplenium todayense Christ.

Todaya, *Copeland* 1254, *Williams* 2460.

Unknown elsewhere.

Asplenium normale Don.

Terrestrial along streamlets in dense woods, Mt. Apo, alt. 2100 m., No. 11527. "Calingo." The fronds of this fern are clustered. No. 11398, from the same neighborhood, is a diminutive form, differing from *A. trichomanes* in being lax and rather flaccid.

Northward to the Benguet region, on high mountains. India to Celebes; and Hawaii (?)

Asplenium tenerum Forst.

On mossy trunks, Todaya, alt. 1150 m., No. 10755. "Libagod."

Throughout the Philippines.

India and the Seychelles to Polynesia.

Asplenium Belangeri Kze.

On trunks in dense forest, Mt. Calelan, alt. 1159 m., No. 10794. "Bangat."
Mindanao.
Malaya, Tonkin.

Asplenium scandens J. Sm.

On mossy trunks in very humid forest, Todaya, alt. 1050 m., No. 10702. "Chalesi."
Mindanao, Leyte.
Borneo to Fiji.

Asplenium persicifolium J. Sm.

Dense tufts on trunks in dense forest, Todaya, alt. 1200 m., No. 10889. "Libagod." Variable and not common.
Northward to central Luzon.
Celebes.

Asplenium griseum Copel.

By Sibulan river Todaya, alt. 700 m., *Copeland* 983.
Camp Keithley.

Asplenium acrophyllum Swtz.

In dense woods near Sibulan river, alt. 400 m., No. 11196. "Sayuk." Beside typical material, there are some plants with the pinnae all linear.
Throughout the Philippines.
The Comores to Polynesia.

Asplenium caudatum Forst.

Todaya, alt. 700 to 1200 m., *Copeland* 1504, 1195; Mt. Apo, alt. 1900 m., *Williams* 2474.
Throughout the Philippines.
Pantropic.

Asplenium pellucidum Lam.

Along Sibulan, alt. 500 m., *Copeland* 971.
Common in the Philippines.
Malaya to Polynesia and Madagascar.

Asplenium militare Copel.

In damp gorge, Mt. Apo, alt. 1800 m., *Copeland* 1505. *DeVore* and *Hoover* 321.
Unknown elsewhere.

Asplenium affine Swtz.

Todaya, alt. 700 m., *Copeland* 1502.
Northward to central Luzon.
Malaya to Polynesia, Ceylon, and the coast of Africa.

Asplenium cuneatum Lam. var. **tripinnatum Fourn.**

Mt. Apo, in damp forest. *DeVore* and *Hoover* 318.
The species throughout the Philippines and pantropic.

Asplenium laserpitiifolium Lam.

Catalonan (foot of Calelan), in damp forest, *Copeland* 946.
Throughout the Philippines.
Malaya to Polynesia and tropical Australia

STENOCHLAENIA J. Smith.

Stenochlaenia sorbifolia (L.) J. Sm. sensu lat.

Climbing small trees in humid forest, Todaya alt. 1200 m., No. 11788. "Libagod." Of the species recognized by *Underwood*, this plant is nearest *S. Brackenridgei (Carr.)* Construing the species narrowly, it is not *S. leptocarpa (Fée) Underw.* If it is regarded as a new species, it will be the fifth Philippine *Stenochlaena* known each from a single collection.

PHYLLITIS Ludw.

Phyllitis pinnata (J. Sm.) O. K.

Bank of Baruring river, alt. 900 m., No. 10808. "Libagod." No. 11157 is a very slender form of the same species, Sibulan river, alt. 500 m.

Mindanao, Leyte, Luzon (Camarines).

CONIOGRAMME Fée.

Coniogramme fraxinea (Don) Diels.

On heavily shaded slopes over Baruring river, alt. 850 m., No. 10809. "Libagod."

Mindanao, Luzon.

Africa to Japan and Polynesia.

Coniogramme fraxinea var. **Copelandi Christ.**

In dense forests, Mt. Calelan, alt. 1350 m., No. 11862. "Sayup."

Mindanao, Negros; Luzon, teste *Christ.*

Coniogramme subcordata Copel. spec. nova.

C. bipinnata, membranacea, pinnulis cordatis vel sat abrupte truncatis, caudatis cauda grosse serratis; soris 0.5 vel 0.66 ad marginem protensis.

In very moist woods, Mt. Apo, alt. 1900 m., No. 11484; ibidem, *Copeland* 1135. "Sayop."

C. serrulata (*Bl.*) *Fée*, has longer sori, comparatively acute base and almost entire tips.

MONACHOSORUM Kunze.

Monachosorum subdigitatum (Bl.) Kuhn.

Handsome tufts in moist flats, Mt. Apo, alt. 1800 m., No. 11531. "Pacoo." Caudex 15 cm. high, stout.

Mindanao, Mindoro. A slightly different form in Luzon and Formosa.

India to New Guinea.

MICROLEPIA Presl.

Microlepia Speluncae (L.) Moore.

Terrestial in woods, alt. 500 m., No. 10992. "Libagod."
Common throughout the Philippines.
Pantropic and subtropical.

Microlepia sp. *Davallia villosa Don.*

In dense woods, Todaya, alt. 1200 m., No. 10472. "Alabongau." This fern is not *M. hirta* (*Kaulf.*) *Presl* of Hawaii, but I am satisfied that it is *D. villosa Don.* Of real *M. hirta* I have seen no Malayan specimens, plants so determined being distinct. There is already *M. villosa Presl*—*M. marginata C. Chr*—*Davallia villosa Wall.*,—a name invalid when first used in *Davallia*, and therefore, according to the concensus of opinion of my compatriots, incapable of valid transfer, but still, on the same authority, now able to invalidate the transfer to its proper genus of the original *D. villosa*. My disposition is to call this plant *Dennstaedtia villosa* (*Don*).

New to the Philippines.
India to Java.

Microlepia todayensis Christ in P. J. S. 3, C (1908) 272.

In wet, dense woods, Todaya, alt. 1200 m. "Dalabungan."

Hitherto known only from my own collection in the same place.

Microlepia strigosa (Thunb.) Presl.

Terrestrial in dense tufts in light woods, Mt. Calelan, alt. 1050 m., No. 11641. "Lagolay."
Throughout the Philippines, not common.
India to Japan and Polynesia.

DENNSTAEDTIA Bernh.

Dennstaedtia dennstaedtioides Copel.

On moist humus in dense woods, Mt. Apo, alt. 1700 m., No. 11564. "Bangat." This material is larger than the type, collected in the same locality, perhaps from a younger plant.

Known also in the Benguet region.

Dennstaedtia Smithii (Hook.) Moore.

In sandy and rocky soil along creek, Mt. Apo, alt. 1750 m., No. 11513.

Commonest in central Luzon, rare elsewhere in the Philippines.

Dennstaedtia Hooveri Christ in P. J. S. 2, C (1907) 169

Along streamlets in forest, Mt. Apo, alt. 1700 m., No. 11430. "Lalobungan."

Already known here and at San Ramon.

Dennstaedtia scabra (Wall.) Moore.

Mt. Apo, alt. 1800 m., *Copeland* 1482.

Malindang, Halcon, and the Benguet highland.

Malaya to Ceylon, China and Japan.

Dennstaedtia scandens (Bl.) Moore.

A sprawling climber over thickets on sandy and stony soil, Mt. Apo, alt. 1750 m., No. 11516. "Sagpang."

Mindoro. Collected on Mt. Dagatpan by *Warburg*.

Malaya, Samoa.

HYPOLEPIS Bernh.

Hypolepis tenuifolia (Forst.) Bernh.

Terrestrial in local open spots, usually along creeks, Mt. Apo, alt. 1800 m., Nos. 11532, 11579. "Sagpang." This is the type of the genus *Hypolepis*. It is so close to

Dennstaedtia scandens that if *Dennstaedtia* were not already one of the primitive genera which it is at best hard to diagnose, this plant could be included in it. There is no natural reason for including *Hypolepis* in the *Pterideae*. As to the possibility that such genera as *Notholaena* and *Cheilanthes* are descendents of *Hypolepis*, I have not yet matured an opinion; there seems at present to be equally good reason for seeking their origin in *Dryopteris*.

Throughout the Philippines.

China to New Zealand.

PAESIA St. Hil.

Paesia Elmeri Copel. spec. nova.

P. maxima quadripinnata; pube rufo et albido, subglanduloso; pinnis usque ad 50 cm. longis, fere sessilibus; pinnulis^{1} majoribus 12 cm. longis; pinnulis^{11} usque ad 18 mm. longis; pinnulis^{111} infimis liberis, 3 mm. longis, oblongis, obtusis, integris vel ad apicem leviter fissis; segmentis sequentibus pinnularum^{11} adnatis, demum confluentibus, plerumque unilateraliter (acroscopice) soriferis.

Mt. Calelan, alt. 2150 m., No. 10623. "Sagpang."

"Dense and well interlaced masses upon moss-covered soil of dry, wooded ridges..... Stipes not brittle, rich brown, reclining, the growing tips ascending." *Paesia* is a genus of very similar species, which appears to me to have no very near affinity to *Pteris*. As the Bagobos understand, *Paesia* is certainly intimately related to *Hypolepis* and *Dennstaedtia*.

DAVALLODES Copel.

Davallodes hirsutum (J. Sm.) Copel.

Large clumps encircling small trunks in dense forest, Todaya, alt. 1200 m., No. 10891. "Paco."

Already collected here; not rare in Luzon.

Reported from Celebes and Borneo.

SACCOLOMA Kaulf.

Saccoloma moluccanum (Bl.) Mett.

In rich soil in deep forest, Mt. Apo, alt. 1200 m., No. 11717. "Somangal." Caudex suberect, 25 mm. thick.

Negros, Mindoro, Luzon.

Malaya, Polynesia.

DAVALLIA Smith.

Davallia wagneriana Copel.

On mossy trunks in dense forest, Todaya, alt. 1150 m., No. 10761. "Panya-angan."

Known only here and in Negros.

Davallia bullata Wall.

On mossy trunks of large trees near Baruring river, alt. 1150 m., No. 10690. "Maresig."

Lake Lanao; common in the Benguet region.

Malaya to India and Japan.

Davallia divaricata Bl.

Todaya, alt. 700 m., *Copeland* 1479.

Mindanao, Mindoro.

Malaya to northern India.

TAPEINIDIUM (Presl.) C. Chr.

Tapeinidium pinnatum (Cav.) C. Chr.

On a forested ridge, Mt. Calelan, alt. 1450 m., No. 10912. "Libagod." A quite uniform form, intermediate between the pinnate and decompound forms.

Throughout the Philippines.

Malaya, Polynesia.

LEUCOSTEGIA Presl.

Leucostegia hymenophylloides (Bl.) Bedd.

Epiphytic in very moist woods, Mt. Calelan, alt. 1200 m., No. 11801. "Dumadapo."

Throughout the Philippines.

India to Polynesia.

Leucostegia immersa (Wall.) Bedd. var. **amplissima Christ.**

On tree-fern trunks and mossy rocks, Mt. Apo, alt. 1750 m., No. 11548. "Tanolan."

The variety ranges from Luzon to Celebes.

HUMATA Cav.

Humata botrychioides Brack. (?)

In mossy forest, Mt. Apo, alt. 1800 m., *Copeland* 1030, 1472. I do not believe that the Philippine plants are the real *H. botrychioides* of Polynesia, but they have so far passed for it.

Benguet highlands.

Reported also from Celebes.

OLEANDRA Cav.

Oleandra colubrina (Blco.) Copel. var. **nitida Copel.**

In tufts and subscandent, Mt. Calelan, alt. 1450 m., No. 10908. "Panaiangan."

The variety was described from San Ramon. The species is found throughout the Philippines and probably in Malaya.

Oleandra Whitmeei Bak.

On nether or sheltered side of large trunks on a ridge, Mt. Apo, alt. 2150 m., No. 11451. "Baraway." The plant is less particular about protection in wet woods 600 meters lower down.

Previously collected here and on Mt. Halcon.
Celebes, Samoa.

ARTHROPTERIS J. Smith.

Arthropteris obliterata (R. Br.) J. Sm.

Upon small, smooth trees, in dense woods, Todaya, alt. 1100 m., No. 10677. "Libagod."
Mindanao, Luzon.
Africa to Polynesia.

NEPHROLEPIS Schott.

Nephrolepis barbata Copel.

Epiphytic in copses, Todaya, alt. 1100 m., *Copeland* 1286, 1470.
Camp Keithley, Mt. Halcon.

ODONTOSORIA (Presl) Fée.

Odontosoria chinensis (L.) J. Sm.

Along the Sibulan river, alt. 750 m., No. 11786. "Lumigal." Common in moist places with sufficient light.
Throughout the Philippines.
Malaya to Madagascar, Japan and Polynesia.

LINDSAYA Dry.

Lindsaya pectinata Bl. (*L. scandens Hook.*)

Epiphytic in humid forest, Todaya, alt. 1050 m. "Libagod." The most of this collection is typical *L. scandens*, but mixed through it, on the same rhizomes with fronds with "continuous" sori, are fronds whose sori are broken into units, as in typical *L. pectinata*. The recurved pinnae and continuous sori are characters by no means always found together. For instance, my No. 1708, from San Ramon, has

continuous sori, and the lower edge of the pinna straight.
Common northward to La Laguna, Luzon.
Malaya and southern Asia.

Lindsaya apoensis Copel.

On mossy trunks, Mt. Apo, alt. 1800 m., No. 11563. "Libagod."
Collected here several times.

Lindsaya cultrata Swtz.

On mossy ledges along Sibulan river, alt. 900 m., No. 10834. "Libagod."
Common throughout the Philippines.
Malaya to Madagascar, India and Queensland.

Lindsaya davallioides Bl.

Terrestrial on steep, wooded slope, Mt. Apo, alt. 1460 m., No. 10907. "Sigbut."
Northward to central Luzon.
Malaya.

Lindsaya pulchella (J. Sm.) Mett.

On sheltered sides of mossy trunks, Mt. Apo, alt. 2000 m., No. 11439. "Marintok-sigbut."
Throughout the Philippines.
Malaya to Samoa.

PLAGIOGYRIA (Kunze) Mett.

Plagiogyria glauca (Bl.) Mett.

On mossy ground, Mt. Calelan, alt. 2300 m., No. 10644. "Libagod." I have the same form from Apo, and almost the same from Halcon. A somewhat different one occurs in Luzon.
Malaya, southern China.

Plagiogyria Christii Copel.

In dense forest, Mt. Calelan, alt. 1450 m., No. 10910 "Libagod."

The original collection was from Apo. The species has also been found on Halcon.

ADIANTUM Linn.

Adiantum diaphanum Bl.

On sheer, sheltered banks over river, Todaya, alt. 900 m., No. 10727. "Sigbut." The simply pinnate form.

Common in Mindanao and Luzon.

Malaya to India, Polynesia and New Zealand.

PTERIS Linn.

Pteris longipes Don.

In dense woods near Sibulan river, alt. 400 m., No. 11195. "Lacuduk."

Common northward to central Luzon.

Malaya and southern Asia.

Pteris caesia Copel.

Todaya, alt. 850 m., *Copeland* 1515, 963. Unknown elsewhere.

Pteris excelsa Gaud.

Todaya, alt. 1200 m., *Williams* 2457.

Mindanao, Negros, Palauan, central Luzon.

Malaya to northern India and Hawaii.

Pteris radicans Christ (?)

In moist densely wooded flats, Mt. Calelan, alt. 1400 m., No. 11863. "Salodot." Caudex very stout, suberect.

The same fern has been collected on Apo by *DeVore* and *Hoover* No. 320, by myself, and by *Williams* No. 2456. The

Description of *P. radicans*, a Celebes fern, does not fit these specimens well but still nearly enough to make their distinctness doubtful.

HISTIOPTERIS (Agardh) J. Smith.

Histiopteris incisa (Thunb.) J. Sm.

Sprawling over jungles, Mt. Calelan, alt. 1500 m., No. 11809. "Dumalio."

Throughout the Philippines.

Pantropic and subtropical.

Histiopteris montana Copel.

On the summit of Mt. Apo, No. 11385. "Sagpang."

Known here and on Canlaon.

ANTROPHYUM Kaulf.

Antrophyum reticulatum (Forst.) Kaulf.

In damp forests, alt. 1100 to 1200 m., Nos. 10724, 11620. In this, as often in other ample series of specimens, the form described as *A. Clementis Christ* is found; it is most common in tree top collections.

Common throughout the Philippines.

Malaya to Madagascar and Polynesia.

Antrophyum callifolium Bl.

On mossy rocks, Baruring river, alt. 850 m., No. 10824. "Barawai."

Mindanao; Luzon (?).

Malaya, Polynesia.

Antrophyum plantagineum (Cav.) Kaulf.

On mossy trunks, in small clusters, Sibulan river, alt. 1300 m., No. 10535. "Barawit."

Mindanao, Luzon.
Malaya to India and Polynesia.

Antrophyum latifolium Bl.

On wet walls of Baruring gorge, alt. 1100 m., No. 10729. "Serara." The fronds are up to 23 cm. wide.
Previously collected here and at San Ramon.
Malaya to India and China.

Antrophyum immersum (Bory) Mett.

On trunks, in deep ravine, Baracatan creek, alt. 450 m., No. 11090. "Parig-parig."
Mindanao, sometimes at sea level; Palauan.
Malaya, Mascarenes.

VITTARIA J. Smith.

Vittaria alternans Copel.

In soft, dense clumps on mossy trees, above Todaya, alt. 900 m., No. 10663. "Pamantigan." The fronds are larger than the typical, and No. 10760 is perhaps a distinct species.
Lake Lanao and San Ramon, both in Mindanao.

Vittaria lineata Swtz. sensu lat.

In mossy forest, Mt. Apo, alt. 1800 m., *Copeland* 1517.
Throughout the Philippines.
Pantropic.

Vittaria Merrilli Christ in P. J. S. 2, C (1907) 174.

Common in damp woods, alt. 1050 m., No. 10723. "Kalele." The frond reach a length of 150 cm. and the longer ones are usually twisted.

This is the type locality of the species, whose known range extends to Mindoro and Luzon.

Vittaria amboinensis Fée.

Epiphytic near the bases of mossy trunks. Mt. Apo, alt. 2000 m., No. 11477; Mt. Calelan, alt. 2300 m., No. 11331. "Marintok-baraway," "Tagambolun." Especially well developed fronds are almost coriaceous.

Mindoro.

Amboina, Martaban.

Vittaria scolopendrina (Bory) Thw.

In large clumps, pendent from mossy trunks, Mt. Calelan, alt. 1450 m., No. 10904. "Cayop-op."

Mindanao to Mindoro and Catanduanes.

Africa to India and Samoa.

MONOGRAMMA Schkuhr.

Monogramma trichoidea J. Sm.

On trunks, near ground, in very moist woods, Baruring river, alt. 1000 m., No. 10731. "Lomat."

Negros, Mindoro, Luzon, in similar situations.

Borneo.

PLEUROGRAMME (Blume) Presl.

Pleurogramme Loheriana Christ in Bull. Herb. Boiss. II; 6 (1906) 1006.

Small tufts in moss, on ground and trees, summit of Mt. Calelan, alt. 2600 m., No. 11688. "Patogo." In the mossy forests of mountain tops, wherever such a formation is well developed, even down to 1000 meters.

Negros, Mindoro, Luzon.

LOXOGRAMME (Blume) Presl.

Loxogramme dimorpha Copel. in *Elmer's* Leaflets 2 (1908) 407.

The sori are not uniform in position, sometimes being

almost marginal in the very narrow fertile fronds. Dense tufts in humid woods, Mt. Calelan, No. 10803. The tufts completely encircle small trees.

Known only from *Elmer's* collection from the Horn of Negros, where it grows under similar conditions.

Loxogramme conferta Copel.

Catalonan (foot of Calelan), *Copeland* 942.

Mindanao only.

Loxogramme involuta (Don) Presl.

On earth and rocks over Sibulan river, alt. 400 m., No. 11197. "Baraway."

Throughout the Philippines, mostly terrestrial.

Malaya to China and Melanesia.

Loxogramme lanceolata (Swtz.) Presl.

On bowlders near Sibulan river, alt. 500 m., No. 11148. "Baraway."

Throughout the Philippines.

Malaya to Africa, Japan and Polynesia.

ACROSORUS Copel.

Acrosorus exaltatus Copel. in P. J. S. 1, Suppl. (1906) 159.

In tree tops on a dry ridge, Mt. Calelan, alt. 1800 m. "Bagebet-hulan."

Previously known only from Mt. Apo, at the same altitude.

PROSAPTIA Presl.

Prosaptia ancestralis Copel. spec. nova.

P. grandis soris submarginalibus oblique versus marginem apertis; frondibus 60 cm. longis, 5-6 cm. latis, ad alam an-

gustissimam pinnatifidis; segmentis lanceolatis, medio 4 mm. latis rhachin versus dilatatis, integris vel crenulatis; soris utroque latere segmenti cujusque usque ad 10.

Tufts in moss-covered ground and shrub-like trees on or near the summit of Mt. Calelan, alt. 2600 m., No. 11688.[a]

This plant has of course the ciliate paleae, reddish pubescence on the rhachis and texture of leaf, which characterize *Prosaptia* and the related species of *Polypodium*. It might have been described as a new species in either genus; I have preferred to call it *Prosaptia* making the direction of opening the sorus cavity, rather than the strictly marginal position of the opening, the critical character. It may not be out of the way to observe that the discovery of links closing more perfectly the gap, always narrow between *Prosaptia* and *Polypodium*, does not necessitate combining the genera, nor even make their union desirable.

Prosaptia contigua (Forst.) Presl.

Epiphytic, Mt. Apo, alt. 1800 m., No. 11688.[b] The forms with several sori, and with one on each segment, growing together.

Throughout the archipelago, rather common in the mossy forest.

Malaya, Polynesia.

POLYPODIUM Linn.

Polypodium Christii Copel.

In mossy forest, Mt. Apo, alt. 1800 m., *Copeland* 1101, 1520. Unknown elsewhere.

Polypodium diplosorum Christ.

In mossy forest, Mt. Apo, alt. 1800 m., *Copeland* 1008, 1522.

Negros, central Luzon.

Java, Celebes, Borneo.

Polypodium setigerum Bl.

On trunks in wet woods, Mt. Apo, alt. 2000 m., No. 11440. "Baraway-latong." Collected in the same vicinity by *Williams* and myself, unknown elsewhere in the Philippines.

Malaya.

Polypodium caespitosum (Bl.) Mett.

In mossy forest, Mt. Apo, alt. 1800 m., *Copeland* 1010.

Mt. Pulog in Luzon.

Java.

Polypodium congenerum (Bl.) Presl.

In mossy forest, Mt. Apo, alt. 1700 to 1900 m., *Copeland* 1008, 1009, 1523; *Williams* 2487.

Horn of Negros, Benguet.

Malaya.

Polypodium pubinerve (Bl.) Christ.

Mixed with *P. dolichosorum*, Mt. Calelan, No. 10636.[b] *P. setosum* var. *calvum Copel.* from Mt. Halcon would possibly best be referred here; the species is otherwise new to the Philippines.

Java, Celebes.

Polypodium fasciatum (Bl.) Mett.

On mossy ground or limbs, with *P. dolichosorum*, Mt. Calelan, alt. 2300 m., No. 10636.[a] "Marintok." Practically identical with fertile fronds of Javan specimens, and with *Blume's* figure.

The only other Philippine collections are from northern Luzon, and have very narrow fronds.

Malaya.

Polypodium durum Copel. spec. nova.

Rhizomate breve, repente, 2 mm. crasso, paleis ochraceis ovatis acuminatis integris 7 mm. longis dense vestito;

stipitibus proximis, 1-2 cm. longis, nigris, glabris; fronde ca. 20 cm. alta, 8-9 mm. lata, obtusa, deorsum sensim angustata, opaca, rigide coriacea, fere glabra, margine integra acuta; soris supra mediam frondem utroque latere uniseriatis, insertione subimmersa, maturitate globosis, 3-4 mm. latis; sporangiis nigro-setosis.

On mossy ground and branches, summit of Mt. Calelan, alt. 2600 m., No. 11689. "Marintok."

Most nearly related to *P. fasciatum* (*Bl.*) *Mett.*, but much more coriaceous, the fronds obtuse and almost sessile, the sori more sunken and the sporangia bearing some bristles.

Polypodium dolichosorum Copel. in P. J. S. 1, Suppl. (1906) 159.

On densely moss-covered limbs, or roots, or ground, on a wooded ridge, Mt. Calelan, alt. 2300 m., No. 10636. "Baraway."

Previously collected on Mt. Apo, alt. 1800 m., and rather common locally.

Polypodium pleiosoroides Copel.

In mossy forest, Mt. Apo, alt. 1800 m., *Copeland* 1011. This and *P. subpleiosorum Racib.* of Java, are perhaps both to be reduced to *P. sumatranum Bak.*

Negros.

Polypodium cucullatum Ns. et Bl.

Small tufts on mossy trunks, Mt. Calelan, alt 2000 m., No. 11363. "Macaring." A characteristic plant of the mossy forest.

Throughout the Philippines.

Malaya to Ceylon and New Caledonia.

Polypodium gracillimum Copel.

Mt. Apo, alt. 1600 m., No. 10641.[a] This is the type locality. It is also known elsewhere in Mindanao, and at high altitudes in Mindoro and Luzon.

Polypodium muscoides Copel. spec. nova.

P. gregis P. cucullati, minutum; rhizomate breve, erecto; stipitibus brevibus, confertis, haud articulatis; fronde usque ad 5 cm. (plerumque ca. 3 cm.) longa, 3 mm. lata, ad costam alatam in segmenta ob partes inferiores infraflexas triangularia 1 mm. lata proxima pinnatifida; soro solitario, more P. cucullati protecto.

Mt. Apo, alt. 2150 m., No. 11453. "Sigbut." Forming dense soft patches at the bases of mossy trunks.

This is the smallest known species in its group. *P. alternidens* and *P. gracillimum* are not only larger, but also have the segments relatively remote and less compact in shape.

Polypodium clavifer Hook.

Small tufts upon mossy trunks and roots., No. 10641. The individual segments are altogether like those of *P. Yoderi*.

New to the Philippines.

Borneo, New Guinea.

Polypodium solidum (Kze.) Mett.

In tree tops on ridges, alt. 1200 m., No. 11267. "Bagabi-cayo." Small specimens are *Grammitis denticulata Bl.*

Collected before on Apo.

Java.

Polypodium celebicum Bl.

On mossy trunks, Mt. Apo, alt. 1700 m., No. 11421. "Libagod."

Mindanao, Negros, Mindoro, Luzon; wherever the mossy forest is best developed.

Malaya.

Polypodium multicaudatum Copel. in P. J. S. 1, Suppl. (1906) 160.

On mossy trunks, Mt. Apo, alt. 1750 m., No. 11422. "Libagod."

Previously collected here by *Copeland* 1018 and 1532, and by *Williams* 2477.

Polypodium obliquatum Bl.

On mossy trunks, Mt. Apo, alt. 1750 m., No. 11422.[a]

This is probably the commonest fern of the Philippines mossy forest, and is regularly encountered throughout the archipelago.

Malaya to India.

Polypodim venulosum Bl. (*P. erythrotrichum Copel.*)

On mossy trunks, Mt. Apo, alt. 1800 m., No. 11521. "Coleli." The reduction of *P. erythrotrichum* is made by comparison with specimens collected and determined by *Raciborski.*

Mindanao, Mindoro, Luzon, in the mossy forest.

Malaya.

Polypodium subfalcatum Bl.

Small tufts on mossy trunks, Mt. Apo, alt. 1800 m., No. 11537. "Captian." *P. macrum Copel.* is probably a peculiarly delicate form of this.

Northward to Mt. Banajao.

Malaya to India and China.

Polypodium mollicomum Ns. et Bl. (including *P. fuscatum Bl.*)

Elmer's collection is very complete, and includes what I believe to be typical specimens of *P. mollicomum* and of *P. fuscatum.* No line can be drawn between the two.

No. 11474. In small tufts on mossy trunks, Mt. Apo, alt. 1800 m. "Sigbut."

No. 11360. It is a smaller and decidedly more rigid plant, which I do not care to describe as distinct; Mt. Apo, alt. 1500 m. "Rominga."

No. 11474.[a] On dead mossy limbs, Mt. Apo, alt. 1800 m.

This is a very small form of the same species, its stature being presumably due to the unusual illumination it receives by growing on dead limbs. I have seen dwarf forms of several species caused in this way.

Northward to Mindoro.

Malaya.

Polypodium nutans Bl.

Mixed with *P. mollicomum*, Mt. Apo, alt. 1800 m., No. 11474.[a] A few plants, quite distinct, and exactly like Javan specimens.

New to the Philippines.

Malaya, New Caledonia.

Polypodium tenuisectum Bl.

In mossy forest, Mt. Apo, alt. 1800 m., *Copeland* 1529.

High summits northward to Pinatubo.

Malaya, Samoa.

Polypodium pulcherrimum Copel. spec. nova.

Eupolypodium bipinnatum glaberrimum; rhizomate et ad terram et ad arbores late repente, nigro, 1 mm. crasso, paleis ovatis fulvis 2-3 mm. longis vestito; stipitibus inter se ca. 1 cm. distantibus, haud articulatis, paleis paucis minutis caducis vestitis vel ab initio glabris, 2-5 cm. altis; fronde usque ad 35 cm. alta, 7 cm. lata, in caudam linearem pinnatam contracta, aliter bipinnata, rhachi atro, angustissime viride-alato; pinnis contiguis, horizontalibus; pinnulis infra mediam frondem sterilibus, majoribus plusquam 5 mm. longis, 0.3 mm. latis, inter se ca. 1.5 mm. remotis, ala decurrente connexis vel liberis; pinnulis fertilibus acutissimis, in partem medialem dilatatam unisoriatis.

Mt. Calelan, alt. 2500 m., No. 11355. "Libagod-ta lomat" (Fern in the moss.)

Sterile specimens of this fern would surely be mistaken in the field for *Trichomanes*. In fruit it strongly resembles *P. Yoderi*, but differs from that and from all other related

species in being glabrous. *P. tamariscinum Kaulf.* has been reported by *Christ* (Monsunia I, p. 60) from Batjan. *Van Alderwerelt* (Malayan Ferns p. 611) takes it up and describes it as having both surfaces naked. It is possible that their plant is *P. pulcherrimum;* the real *P. tamariscinum* of Hawaii has the surfaces peculiarly and characteristically glandular-roughened.

Polypodium papillosum Bl.

On stumps and mossy bowlders, Todaya, alt. 1150 m., No. 10769. "Ranoan."

Common in Mindanao; rarer northward to Benguet.

Malaya.

Polypodium (Goniophlebium) subauriculatum Bl.

No. 11918. The typical, large form, with fronds, stipes included, 100 to 180 cm. long, and moderately serrate pinnae. Todaya, alt. 1200 m. and downward. "Libagod-ta-cayo."

No. 11438. Comparatively small plants, the pinnae more coarsely serrate toward the apex. In dense forest, Mt. Apo, alt. 1900 m.

No. 10913. Fronds about 40 cm. long, stipe included; pinnae short and broad and coarsely toothed. On undershrubs on a ridge, Mt. Calelan, alt. 1450 m.

No. 11864. Fronds in all up to a meter long; pinnae narrowly linear, coarsely toothed to the base; sori not deeply immersed. This form is perhaps distinct. Epiphytic on *Cyathea*, Mt. Calelan, alt. 1400 m.

The forms of *P. subauriculatum* are as a rule very distinct and constant in a locality, impressing the collector as clear-cut species. I have from Java all the above forms except No. 11864.

Throughout the Philippines.

Malaya to Polynesia and tropical Australia.

Polypodium persicifolium Desv.

Terrestrial in deep, steep ravine of Baruring river, alt. 1150 m., No. 11631. "Liong." Also epiphytic in moist

woods, alt. 1200 m., *Copeland* 1762.[a] The plant is usually epiphytic.

Mindoro.

Java, Celebes.

Polypodium Oodes Kze.

On mossy ledge under falls, Baruring river, alt. 1150 m., No. 11762. This is the "juvenile from" I one described as *P. Rudimentum.*

Luzon, rare.

Borneo.

Polypodium accedens Bl.

On branches in humid woods, alt. 1200 m., No. 11649. "Cari."

Throughout the Philippines.

Malaya, Polynesia.

Polypodium punctatum (L.) Swzt.

In dense clumps, encircling small trunks or large limbs, in moist woods, alt. 1200 m., No. 10920. "Barawai." This fern is a decidedly successful humus collector. It is fairly common in wet but not really mossy forests in Mindanao. Other forms referred to the same species are found throughout the archipelago.

Tropical Africa to Polynesia.

Polypodium validum Copel.

On rocks along river, Todaya, alt. 500 to 850 m., *Copeland* 973, 1259. "Boraue."

Tawi-Tawi, Mindanao, Negros, Mindoro.

Polypodium sablanianum Christ.

On tree trunks, collected from Santa Cruz, *Williams* 2827. Very near *P. myriocarpum (Pr.) Mett.*

Mindanao, Luzon.

Borneo.

Polypodium heterocarpum (Bl.) Mett.

Todaya, alt. 450 to 900 m., *Copeland* 962,965,1251,1536.
Camp Keithley; Luzon.
Java, Celebes.

Polypodium macrophyllum (Bl.) Reinw.

On bases of trees in wet woods, Todaya, alt. 1200 m., No. 11293.
Throughout the Philippines.
Malaya to China and New Guinea.

Polypodium vulcanicum Bl.

Creeping in rock crevices, Mt. Apo, from 2400 m. alt. to the summit, No. 11536. "Cadayogan."
Collected here repeatedly; otherwise known in the Philippines only on Mt. Pinatubo.
Sunda to Celebes.

Polypodium caudiforme Bl.

Creeping on upper side of limbs, Mt. Calelan, alt. 2450 m., No. 11350. "Cayop-yop."
In a treatment of the ferns of Mt. Apo, I am unwilling to merge *P. vulcanicum* and *P. caudiforme* in *P. Feei*. The two forms are here quite distinct in appearance and in habitat; and I do not believe that the environment acting on the individual is entirely responsible for the difference in stature, form and structure.
Mindanao, Negros.
Malaya, Polynesia.

Polypodium dolichopterum Copel. in P. J. S. 1, Suppl. (1906) 162.

Dense tufts on wet, mossy bowlders, along Colan creek, alt. 1150 m., No. 10768. "Libagod."
Northward to central Luzon.

Polypodium ellipticum Thunb.

On a rocky ledge near a stream, alt. 600 m., No. 11164. "Libagod-ta-pangpang."

Common in such situations throughout the Philippines.

Malaya to India, Japan and Queensland.

Polypodium Phymatodes Linn.

Epiphytic in *Casuarina*, alt. 700 m., No. 10461. "Barawetku"; a moderately ample form. Also, on bowlders and wet humus in dense woods in ravines, alt. 900 m., No. 10848. "Libagod-ta-pangpang;" a very narrow form.

Very common in the Philippines.

Malaya to Africa, Tsushima and Polynesia.

Polypodium incurvatum Bl.

On mossy limbs, Mt. Apo, alt. 1800 m., No. 11598. Previously collected here by *Warburg* and myself.

Mindanao.

Malacca, Java, Borneo.

Polypodium palmatum Bl.

In mossy forest, Mt. Apo, alt. 1800 m., *Copeland* 1062, 1538.[a]

Throughout the Philippines, common.

Malaya.

Polypodium angustatum Bl.

Mt. Apo, alt. 1800 to 1950 m., *De Vore* and *Hoover* 330, 341, 376; *Copeland* s. n.; *Williams* 2463.

Mindanao.

Malaya.

Polypodium nigrescens Bl.

Along Sibulan river, alt. 450 m., *Copeland* 964.

Throughout the Philippines.

Malaya to India and Polynesia.

Polypodium albido-squamatum Bl.

No. 11631.[a]

Throughout the Philippines, not very common. Terrestrial in the pine country of northern Luzon; elsewhere an epiphyte.

Malaya, New Guinea.

Polypodium musaefolium Bl.

Large clumps on tree-trunks in humid woods, Todaya, alt. 1300 m., No. 10500. "Marauwi." This is an exceedingly large form, the fronds being 100 to 180 cm. long.

The species is known in the Philippines in this locality only, where it has previously been collected by *Warburg* and myself. The various forms of juvenile plants, apparently very common throughout New Guinea, are unknown here. In size and habit, the Apo form is very like *Asplenium musaefolium*.

Malaya and New Guinea.

Polypodium (Drynariopsis) heracleum Kze.

Epiphytic in moist woods, alt. 1200 m., No. 10495 "Sarawkong." The fronds are almost 3 m. long.

Northward to central Luzon, not common.

Malaya, New Guinea.

DRYNARIA (Bory) J. Smith.

Drynaria quercifolia (L.) J. Sm.

On stones in a rather open gorge, alt. 400 m., No. 11112. "Saraucon." Remarkably large specimens.

Common throughout the Philippines, usually epiphytic.

Tropical Asia to Australia and Fiji.

PHOTINOPTERIS J. Smith.

Photinopteris speciosa (Bl.) J. Sm.

On rocks in a rather open gulch, alt. 400 m., No, 11125. "Libagod."

The same plant grows in Davao as an epiphyte immediately over the beach. At high altitudes in northern Luzon, it is always terrestrial.

Throughout the Philippines.

Malaya.

CYCLOPHORUS Desv.

Cyclophorus nummularifolius (Sm.) C. Chr.

In crown of tree, Mt. Calelan, alt. 850 m.

Throughout the Philippines, on rocks and trees.

Malaya.

Cyclophorus Sarasinorvm (Gies.) C. Chr.

Epiphytic, Todaya, alt. 1150 m., No. 10766. "Sigbut."

Doubtfully distinct from *C. Lingua.*

Mindanao.

Celebes.

DRYMOGLOSSUM Presl.

Drymoglossum heterophyllum (L.) C. Chr.

On limbs of large trees in gorge, Sibulan river, alt. 500 m., No. 11158. "Cuyup-cup." Found also at sea level in Davao.

Throughout the Philippines.

"Tropical Asia."

HYMENOLEPIS Kaulf.

Hymenolepis platyrhynchos (J. Sm.) Kze. var. glauca Copel. var. nova.

Planta pulcherrima ubique coeruleo-glauca, vix aliter a typo diversa.

On mossy trees on a ridge, Mt. Apo, alt. 2100 m., No. 11444. "Maraway."

The species is found on high mountains throughout the Philippines and in Celebes.

Hymenolepis spicata (L. f.) Presl.

No. 11443. The common, small form with narrowly linear fertile apex. The veins are conspicuous and purplish. Mt. Apo, alt. 2050 m. "Kalili." This general form is found throughout the Philippines and at various altitudes.

No. 11432. A very large form, the fronds up to 60 cm. long, with broad fertile apex. Mt. Apo, alt. 1800 m. "Barawit." This form was previously collected here by; *Williams* and myself. It is evidently not rare in Mindanao and what seems to be the same form occurs in the high mountains of northern Luzon. It suggests a hybrid of *H. spicata* and *H. platyrhynchos.*

CHRISTIOPTERIS Copel.

Christiopteris Sagitta (Christ) Copel.

Epiphytic in dense woods along Mararag creek, alt. 1600 m., No. 11568. "Cacain-cain." This material collected in August is all sterile. I searched in vain for fertile fronds in the same locality in October, 1904. This is the form which *Christ* (Bull. Herb. Boiss. 1906, p. 990) suggests separating as a distinct species from *C. Sagitta;* but as it has never been found fertile, and is not really distinct from juvenile forms of that fern, I prefer to regard it as identical.

LECANOPTERIS Blme.

Lecanopteris pumila Bl.

In moist woods above Todaya, alt. 1200 m., No. 10491. "Libagod." Rootstalk glaucous green, and forming a mass similar to a relief map of a mountainous section.

Van Alderwerelt treats *L. pumila* as a variety of *L. carnosa;* if he is right in this, at least one of the Philippine

species is wrongly determined. *L. Curtisii Bak.* is very possibly identical with *L. pumila*.

Java.

ELAPHOGLOSSUM Schott.

Elaphoglossum Copelandi Christ. in P. J. S. 2, C (1907) 176.

In dense clumps in mossy trees, Mt. Apo, alt. 1800 m., the type locality, No. 11538. "Baraway."

Horn of Negros.

Elaphoglossum callifolium (Bl.) Christ.

On densely mossy limbs, Mt. Calelan, alt. 1700 m., No. 10638. "Barawai."

Mindanao, Horn of Negros.

Java.

Elaphoglossum laurifolium (Thouars) Moore.

Mt. Calelan, alt. 2150 m., No. 11658.[a]

Northern Luzon.

Malaya, India, Mascarenes.

Elaphoglossum Elmeri Copel. spec. nova.

Stipitibus confertis, frondis sterilis ca. 8 cm. frondis fertilis ca. 22 cm. altis, paleis membranaceis usque ad 8 mm. longis et 5 mm. latis sat deciduis vestitis; fronde sterile oblanceolata, 20 cm. alta, prope apicem rotundatam 35 mm. lata, deorsum sensim angustata, opaca coriacea, margine cartilaginea; fronde fertile lineari-elliptica, 16 cm. alta, 22 mm. lata, abrupte brevi-decurrente.

Mt. Calelan, alt. 2150 m., No. 11658.

Intermediate between *E. decurrens* (*Desv.*) *Moore* and *E. luzonicum Copel.*, distinguished from the former by the broad paleae and stipitate fronds; from the latter by the texture, which is much more coriaceous, and by the shape of the fronds.

PLATYCERIUM Desv.

Platycerium grande J. Sm.

In bamboo forests and wooded ravines, alt. 300 to 900 m., No. 11183. "Banola-colago." Collected at Todaya by *Williams* 2517. This or another species occurs also over the beach.

Mindanao to southern Luzon, along the Pacific coast. Malaya, tropical Australia.

CHEIROPLEURIA Presl.

Cheiropleuria biscuspis (Bl.) Presl.

On a wooded ridge, Mt. Calelan, alt. 1400 m., No. 10902. "Balah-lomatan."

In similar places throughout the archipelago.

Malaya to LiuKui and New Guinea.

ACHROSTICHUM Linn.

Achrostichum aureum Linn.

Forming tussocks near the beach. No. 11992. "Sayop." The only coast fern in this collection. Throughout the Philippines, only exceptionally away from the coast.

Pantropic.

LYCOPODIACEÆ

LYCOPODIUM Linn.

Lycopodium cernuum Linn.

On wall of varine, Todaya, alt. 1150 m., No. 11554. "Sagpang." Common on the summit of Apo also.

Throughout the Philippines.

Pantropic.

Lycopodium sp. (?)

A minute sterile plant No. 11560, having the "Brutknospen" of *L. lucidulum Mx.* and *L. reflexum Lam.*, but probably distinct from these and the other species known to produce such structures.

Lycopodium verticillatum Linn.

Pendent from mossy trunks, Mt. Calelan, alt. 2150 m., No. 11659. "Icog-icog."

Mt. Halcon.

Mascarenes, Polynesia, tropical America.

Lycopodium squarrosum Forst.

Epiphytic in dense forest, Todaya, alt. 1150 m., No. 10783. "Kalili."

Throughout the Philippines.

India to Polynesia.

Lycopodium filiforme Roxb.

Epiphytic along Sibulan river, alt. 900 m., No. 10665. "Bai-pannaiang."

Northward to central Luzon.

Monsoon region.

Lycopodium scariosum Forst.

Summit of Mt. Apo, No. 11384. "Bangat." This is the fourth collection from this spot.

The species is otherwise unknown nearer than Australia

PSILOTACEÆ.

TMESIPTERIS Bernh.

Tmesipteris tannensis Bernh.

On tree-fern trunks, Mt. Calelan, alt. 1200 m. "Libagod."

Mt. Apo, Mt. Halcon, Mt. Data.

Australia, Polynesia.

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THREE NEW CYPERACEAE

BY

A. D. E. Elmer

—o—

Carex Elmeri Kük. in *Fedde's* Repertorium VIII (1910) 326.

Rhizoma caespitosum. Culmus lateralis 20 cm. altus debilis compresso-triangularis laevis paucifoliatus sub inflorescentia dilatatus. Folia sterilia culmum longe superantia 4—5 mm. lata plana breviter acuminata marginibus sursum scabra utrinque aspera graminea, vaginae basilares brunneae dissolutae. Spiculae 3—4 fastigiatae, terminalis masc. linearis vix pedunculata, laterales 2—3 fem. oblongae pauci-et laxiflorae vix 1 cm. longae breviter pedunculatae. Bracteae foliaceae inflorescentiam longe superantes subvaginantes. Squamae fem. oblongo-lanceolatae pallide rufae e dorso tricostato aristatae. Utriculi squamas duplo superantes suberecti ellipsoidei obtuse trigoni 5 mm. longi intense virentes superne parce scabri nitidi plurinervosi basi attenuati in rostrum longum ore hyalino bidentulum excurvum subabrupte abeuntes. Nux utriculum explens trigona lateribus concavis. Stigmata 3.

Philippinen: Prov. of Benguet, Baguio (*A. D. E. Elmer*, no. 8444.)

Aus der Verwandtschaft von *Carex Loheri C. B. Clarke*,

aber durch an zentraler Blattrosette seitlich stehende Halme, breitere am Rande nicht weiss-schülferige Blatter, an der Spitze des Halms zusammengedrangte Ahrchen und lange Bracteen von dieser geschieden.

Cladium juncoides Elm. n. sp.

Dense tufts, 4.5 dm. across; stems erect, 6 dm. high, straight, entirely covered by the ensiform leaf bases, terminated by strict panicles. Leaves copious, much ascending, thickly coriaceous, very smooth and similarly glaucous green on both sides, gradually tapering to the rather sharp point, 7 mm. wide, 3 to 5 dm. long, the margins usually brown, the basal portions ensiformly clasping. Panicle 2 to 3 dm. long, the lower main branches subtended by large foliaceous bracts; rachis green, scaberulous especially along the striae or on the angles; head clusters scattered, erect, sheathingly subtended by brown bracts; spikelets few in each cluster, 2 to 3-flowered, the uppermost flower sterile; bracts imbricately folded, ovately or oblongish lanceolate, brown scaberulous on the exposed portions, scabrid along the dorsal keel, acuminately pointed; ovary glabrate, compressed, bearing a whitish dense tuft of soft hairs; style 2 mm long, glabrate; stigma lobes 3, reddish brown, curvingly spreading, finely puberulent, as long as the style; stamen 1, arising from the base of the ovary, its glabrous filament 4 mm. long; anther linearly oblong, 2.5 mm. long, basifixed, truncate at base, terminated by an abrupt rather sharp point; fruits not seen.

Type specimen 12150, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, March, 1910.

This fine species was discovered in wet sand gravelly soil among rocky deposite along the Pauala river at 750 feet. "Magod-tangiad" is the Visayan name.

Vegetatively very similar to *Cladium* (*Baumea*) *meyenii Kth.*, but there seems to be only one stamen in our flowers.

Fimbristylum utilis Elm. n. sp.

Tall, rank tufts or tussocks; stems green, numerous, erect, smooth and shining, terete, 1 to 2 m. high; roots numerous, glabrous, filiform. Leaf sheaths 2 to 3, subinflated, shining, the basal sheaths open and brown margined, the upper ones only with oblique glabrous throats but otherwise united and 2 dm. long. Inflorescence and infrutescence 5 cm. long, almost as wide; the branches once or twice branched, subtended by involucral bracts; bracts at most 1 cm. long, stout, acuminately tapering, hyaline margined, those subtending the upper much shorter; heads sessile or upon 6 mm. long pedicels, short ellipsoid, 4 mm. long; empty glumes 1.5 mm. long, glabrous, brown, keeled toward the apex, with hyaline sides or margins; bracts short, persistent, hyaline, more or less united about the base; seed subtended by 2 lateral bristles which equal the style, broadly obovoid, 0.75 mm. long, finely verrucose, dorso-ventrally flattened, light straw brown; style articulate at the base, the basal one third thickened, fully 1 mm. long, glabrous; stigma 2, divergently spreading, as long if not longer than the style.

Type specimen 12571, *A. D. E. Elmer*, Basay, Island of Samar, June, 1910.

In low compact black soil of marshes, and is reported to form dense growths. The local Visayan call it "Tigog" or "Tikog," and its stems are extensively used in mat weaving.

Only critically distinguished from *F. globulosa* (*Retz.*) *Kth.*, most notably in the two not three stigmas, and seeds with 2 rather than with 3 ridges.

THE ESCOLTA PRESS, INC.

LEAFLETS OF PHILIPPINE BOTANY

EDITED BY A. D. E. ELMER, A. M.

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NOTES ON FAGRAEA

BY

A. D. E. Elmer

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Fagraea plumeriaefolia DC.

Field-note:—Scandent upon small trees in a very humid forested flat at 3000 feet; branches widely spreading, crookedly rebranched; leaves mostly descending and flat, coriaceous, dull green above, much lighter beneath; inflorescence ascending, green, the stalks more or less brown lenticelled; corolla 2.5 inches long, succulent, creamy white, turning creamy yellow with age; stigma greenish; anthers ashy brown, deciduous; flower slightly fragrant and much visited by butterflies on sunny days. "Butoon-tausa" is the Bagobo name.

Represented by number 11915, *Elmer*, Todaya (Mt. Apo), Mindanao, October, 1909.

This is nearly typical *de Candolle's* species, which was based upon *Cuming* 838 from the province of Albay, Luzon. There is a strong tendency of plants from the south-eastern portion of Luzon to extend through Leyte into central and eastern Mindanao.

Fagraea obovata Wall.

Field-note:—Shrub 8 feet high, in shrubberies on cliffs

and dipping into tide water; stem a few inches thick, terete, branched from near the base; branchlets quite slender, thick, heavy, usually curved and with ascending tips; wood soft, porous, dull white, odorless, with a faint sweet taste; bark smooth, yellowish to gray; leaves spreading, thickly coriaceous, a trifle paler beneath, flat; fruits terminal, shining deep green, the whitish meat viscid and containing numerous small brown seeds, usually 1 to 3 fruits to each twig.

Represented by number 12152, *Elmer*, Romblon, March, 1910.

This species has a wide range in area and altitude, and in the Philippines it usually inhabits alpine regions. In places along the coast upon rocky limestone outcroppings it extends clear down to sea level and even thrives in saline crevices constantly washed by the waves.

Fagraea nonok Elm. n. sp.

Shrubby, suberect or more or less strangling in habit; stems several, 7 to 14 cm. thick, perfectly terete, branched from near the base; branches ample, the ultimate ones slender, curved, somewhat drooping, crookedly rebranched, with ascendingly curved tips, the leafy portion green and glabrous, wood soft, greenish white, a trifle bitter; bark mostly brown, very smooth, blotched with gray, green beneath the epidermis, easily stripping. Leaves oppositely crowded toward the ends of the branchlets, chiefly ascending, rigidly coriaceous, glabrous, folded upon the upper very deep green surface, the short acute tips twisted and abruptly recurved, margin entire and subinvolute in the dull brown dry state, much paler green beneath, greatly varying in size, the smaller ones oblanceolate, the larger oblanceolately oblong, 15 cm. long, 5 cm. wide above the middle, rounded at the apex and with an abrupt acute point, attenuate toward the base, the lamina decurrent nearly to the base of the petiole; petiole glabrous, blackish when dry, 1 to 2 cm. long, plated at the base; plates 7.5 mm. wide, about as high, divided, very thick, dark green; midvein dark brown or nearly black, lateral nerves 7 to 11 pairs but very obscure. Infrutescence

heavy as are also the leaves and twigs, erect or ascending; 3 to 5-clustered; stalks thick, dark green and glabrous, about 2 cm. long, at the distal end bearing a pair of opposite scars from which the subtending flowering bracts have fallen; calyx yellowish green, thick and rigid, 3 cm. long, the basal one half stipitate; the lobes usually 5, elliptish oblong, imbricate, on the dorsal side usually provided with brown excrescences; fruit oblongated ellipsoid, the average ones 7.5 cm. long, 2.5 cm. thick across the middle, more tapering toward the brown basal region, apex abruptly constricted into a green point, lead color or light olive green, very shiny; rind thick, enclosing numerous short ellipsoid and finely pitted seeds.

Type specimen 12285, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

Only one plant of this coarse species was seen upon a snag in rich pasture lands along the Pauala river at 500 feet. "Nonok" is the Visayan name.

In my Synopsis of Fagraea, page 599 of these "Leaflets", I referred this same species under *F. auriculata Jack*, from which ours really differs in having thinner and smaller leaves, and petiole bases with peculiarly shaped auricular plates. Flowers not seen on our specimens, but the calyx of the fruiting specimens is only one half as large and thick. The flowers of *Jack's* Malayan species are described as deep yellow, calyx light green, petals nearly 0.125 inch thick.

Fagraea gitingensis Elm. n. sp.

A gnarly, more or less erect tree; stem 2.5 dm. thick, 7 to 10 m. high, its main branches arising from below the middle; branches widely spreading, numerously rebranched; twigs glabrous, crooked, relatively short, suberect; wood very bitter, odorless, heavy, sappy white, quite soft; bark yellowish gray, smoothish; leaves copious, ascending, oppositely clustered toward the ends of the twigs, thickly coriaceous, nearly flat, deep green above, much paler or yellowish green beneath, glabrous, obovately oblong, turning yellowish brown while drying, the lamina 12 cm. long, 3.5 cm. wide above

the middle, rounded at the apex, attenuate toward the base, the entire margins curved upon the under side in the dry state; petiole glabrous, reddish brown when dry, 2 cm. long, at the base with small adnate or plated stipules less than 5 mm. long; midnerve similar in color beneath, with 7 to 9 very obscure lateral pairs. Inflorescence terminal, erect, usually 3-flowerd, deep green except the inner organs of the flowers; peduncle about 1 cm. long; pedicels scarcely more than one half as long, smooth; calyx 2 cm. long, the lower one third stipitate, subtended by 2 pairs of short rather blunt bracts, the middle one third rounded and cylindric; the segments 7.5 mm. long, imbricate, oblong, obtusely rounded at the apex, with thin margins, usually 5, spreading in the fruiting state; corolla 7 to 11 cm. long, early wilting, caducous, greenish toward the base, otherwise creamy white, sweetly fragrant, glabrous, tubular, terminated by 5 oblong 15 mm. long segments; stamens also 5, included, whitish as is also the interior of the tube; filaments slender, smooth, inserted below the midde of the tube; anther 1 cm. long, linear, basifixed and bilobed at the base; pistil glabrous, equalling the corolla, greenish especially the broadly 2-cleft stigmas; fruit ellipsoid, terete, shining orange red, at least 2.5 cm. long, erect bearing a nipple-shaped point; seed brown, numerous, subglobose, 1 mm. in diameter, pitted.

Type specimen 12224, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

Discovered in sand gravelly soil of woods along the banks of the Pauala river at 1000 feet. It was quite frequently observed along the same river at both higher and lower altitudes.

Very distinct from all other Philippine species of *Fagraea*, and is related to *F. tubulosa Blm.* and *F. carnosa Jack*, both extra Philippine.

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LEAFLETS OF PHILIPPINE BOTANY

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THE CALLICARPAE OF MOUNT APO

BY

A. D. E. Elmer

—o—

Callicarpa apoensis Elm. n. sp.

Tall tree; stem 13 m. high or higher, 4.5 dm. thick; branches mainly toward the top, crookedly rebranched and forming a flattish crown; twigs not numerous, heavy, suberect, more or less angular, the terminal portion greenish and covered with a grayish brown pulverulence; wood very soft, whitish, with no taste nor odor; bark yellowish brown, rather finely checked longitudinally. Leaves ascending or horizontal, curvingly conduplicate on the upper dark green and glabrous side, the lower side grayish white with dirty brown nerves and bright yellow glistening glands, margins entire, oblong to subelliptic, varying from 1 to 2 dm. long and averaging 7.5 cm. wide across the middle, short acute at apex, base obtuse to cuneate, always opposite; midrib raised beneath, glabrate or finely ashy scurfy, with 9 to 12 oblique lateral pairs whose tips are reticulately united, all yellowish when fresh, brown when dry, cross bars relatively conspicuous and with fine reticulate veins between them; petiole stout, 3 cm. long, finely and dirty yellowish brown or gray scurfy, shallowly grooved along the upper side. Inflorescence erect, from the uppermost leaf axils; peduncle also stout, besides being similarly pulverulent more or less

covered with glistening glands, strict, averaging 7.5 cm. in length, toward the top bearing a few bracts; the paniculate corymb 1 dm. wide; all the branches grayish tomentose, subtended by bracts, only sparsely sprinkled with glands; flowers sessily clustered at the ends of the ultimate branchlets, the fascicles subtended by inequal spatulate bracteoles, the individual flowers subtended by circles of short straw-colored hairs; calyx cup-shaped, 1.5 mm. high, nearly as wide across the top, on the outside of the rim beset with numerous light colored glands, otherwise short stellately pubescent, subtruncate or obscurely dentate; corolla whitish, glabrous and eglandular except on the outside of the lobes, 3 mm. long, the basal one half united, the 5 segments broadly oblong or subelliptic; stamens well exerted, glabrous, the slender filaments attached to the base of the corolla tube; anthers 1 mm. long, ovately ellipsoid, bilobed and basifixed; style equalling the stamens, glabrous, thickened toward the apex, terminated by a suboblique and obscurely lobed disk-like stigma; ovary densely covered with light yellow glands; fruits subglobose, 3 mm. in diameter at most, subtended by the cyathiform calyx, glandular, with 4 achene-like seeds, turning reddish.

Type specimen 11491, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, August, 1909.

In moist earth of very deep sandstone cuts along the Seriban creek at 5750 feet, below Baclayan the highest mount Apo camping place. The Bagobos call it "Lay-au-pan." Very rare!

Its general appearance at once place it near *C. subalbida Elm.*, but there are distinct vegetative differences besides minor characters in the flowers and fruits. Ours from Apo is a fine erect tree.

Callicarpa caudata Max.

Field-note:—Shrub 12 feet high; stem round, 1.5 inch thick, laxly branched; twigs yellowish gray, tomentose; bark smooth, of the same color; the wood odorless and without taste, soft, greenish white, with a large pith; leaves limp, descending, green above, yellowish or the stalks greenish,

suberect, bearing small pale blue and odorless flowers. On very humid forested ravines at 4500 feet of mount calelan. This the natives or Bagobos call "Cabati-bati."

Represented by number 11333, *Elmer*, Todaya (Mt. Apo), Mindanao, August, 1909.

Callicarpa flavida Elm. n. sp.

A tree-like shrub; stem 15 cm. thick, 6 m. high; branches mainly at the top, widely spreading, the ferruginous twigs ascending; wood without taste or odor, soft, light, white; bark yellowish, finely checked. Leaves horizontally spreading along the pulverulent branchlets or occasionally opposite, chartaceous, shallowly conduplicate on the upper deep green surface, beneath clothed with a light ferruginous stellate puberulence, the recurved tips slenderly and sharply acuminate and occasionally subfalcate, base cuneate or abruptly and frequently inequilateral, oblongish or lanceolate oblong, the average blades 15 cm. long by 5 cm. wide across the middle, the young ones stellately lepidote on the upper side but soon wearing off except along the impressed larger nerves, entire; midrib pronounced, with 7 to 9 ascendingly curved lateral pairs, cross bars conspicuous beneath, all ferruginous lepidote; petiole 1 to 2 cm. long, similar in vestiture. Inflorescence axillary, ascending, the 3 to 5 cm. long peduncles pulverulent; corymb 3 cm. high, twice as broad, all the branches finely lepidote and subtended by linear and similarly pubescent bracts; flowers grouped toward the end of the ultimate branchlets; pedicels 2 mm. long, subtended at the base by minute bracts, articulate at the middle; calyx 2.5 mm. deep, cup-shaped or campanulate, truncate or bluntly 7-apiculate, finely stellately puberulent and minutely glandular dotted on the outside; corolla pale blue, 5 mm. long, the basal one half broadly tubular, more or less glandular punctate, the linear oblong 7 segments recurved; stamens 7, glabrous, exerted, the slender filaments attached at the base of the corolla tube; anthers 2 mm. long, oblong, bilobed and basifixed, laterally dehiscent; style 7 mm. long or as long as the stamens, glabrous, bearing a capitate stigma; ovary yellowish glandular; fruits globose, 5 mm. thick, glandular and with minute clusters of ferruginous hairs even

in the mature state, bright red, with 7 achene-like seeds; seeds plane on both inner sides, convex on the dorsal side, sharply pointed and notched at both ends.

Type specimen 11851, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September, 1909.

Collected in good soil of dense woods on a steep slope along the Sibulan river at 4000 feet. Rare! The under side of the leaves is rather dull flavus both in the fresh and the dry states. "Lai-au-pan" is the vernacular or Bagobo name.

Its affinity is with *C. paloensis Elm.*, yet there are a number of important differences both in the fruit and flower.

Callicarpa blancoi Rolfe

Field-note:—Low and tough shrubs; stem 3 to 5 feet high, single or several from the same root cluster, branched from near the base; bark smooth, yellowish brown, thin; wood tough, greenish white, odorless and tasteless; branchlets ascending, slender, sparingly rebranched; leaves descending, conduplicate on the upper pale green surface, yellowish green beneath, membranous; inflorescence erect, axillary, blue, slightly odorous; berries globose, shining deep indigo blue. In dry more or less rocky soil of the upper cogon region at 1500 feet. "Sigbat-ta-caran" is the native Bagobo name.

Represented by number 10985, *Elmer*, Todaya (Mt. Apo), Mindanao, June, 1909.

Nearly typical. *C. ovata C. B. Rob.* is from the same locality and has more ovate or ovately elliptic leaves than our specimens.

Callicarpa affinis Elm. n. sp.

A rather low and stocky tree; stem 5 m. high, 2.5 dm. thick, bearing toward the top an umbrella-shaped crown of widely spreading limbs; bark yellowish gray, checked; wood burly, moderately hard, without taste and odor, whitish; twigs subangular, greenish, rather slender, covered with yellowish brown stellately clustered hairs, suberect. Leaves opposite, subopposite or even ternately whorled, widely scattering along the branchlets, folded upon the upper glabrous surface ex-

cept the impressed midrib, much paler beneath and densely covered with soft stellately grouped hairs, oblong to subelliptic or the smaller ones ovately oblong, apex abruptly acute to acuminate, base subcuneate or obtusely truncate, entire, the medium blades 2 dm. long by 1 dm. wide across the middle or a trifle below it, quite unequal in size; midrib pronounced, with 7 to 9 oblique lateral pairs whose apices are reticulately united, cross bars conspicuous, all grayish brown pubescent beneath and the larger ones similar on the upper side; petiole stout, scurfy or short stellately hairy. Inflorescence suberect, from the uppermost leaf axils; peduncle twice as long as the petioles, similar in vestiture; the corymb paniculately branched, 1 dm. across; all the branches stellately scurfy, dirty brown, subtended by bracts, the lowermost of which are linear and measure nearly 2 cm. long; flowers mostly toward the ends of the ultimate branchlets; pedicels 1.5 mm. long, articulate at the middle; calyx campanulate or broadly cup-shaped, 1.5 or 2 mm. high, fully as wide across the truncate or with 5 nearly obsolete apiculations, hairy on the outer side; corolla regular, whitish on the outer and bluish on the inner side, 5 mm. long, the basal two thirds united, glabrous except on the outer side of the 5 more or less oblong segments; stamens glabrous, 5, well exerted, the slender and blue filaments inserted upon the corolla tube toward the base; anthers oblong, bilobed at base and basifixed, retuse at the blunt apex, 2 mm. long; style also blue, at least as long as the stamens, also glabrous, thickened toward the apex, bearing an obscurely lobed whitish stigma; fruits globose, 4 mm. in diameter, glandular, subtended by the cyathiform calyx, light and shining red, sweet, 4-celled and with 4 seeds.

Type specimens 10856 and 11102, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, June, 1909.

The former number was called by the Bagobos "Lay-au-pan" and was collected on hot slightly wooded ridges at 3500 feet, south of the Baruring river. The latter number was called "Nago" by the same natives and grew in compact soil of shrubberies at Daron along the coast.

Its affinity is very close to *C. manga Schauer*, differing notably in the dense stellate hairs of the calyx, larger

and glandular fruits and is much less pubescent in the inflorescent branches. The petioles in ours are also shorter, the average lamina is maller, differently shaped and covered with a different indument. Also similar to, yet specifically distinct from *C. arborea Roxb.* and *C. maingaya King* and *Gamb.*

Callicarpa erioclona Schauer.

Field-note:—Lax shrub; stem 1 inch thick, 9 feet high, laxly branched from below the middle; wood odorless and tasteless, pale white, rather hard; bark yellowish especially beneath the smoothish epidermis; leaves submembranous, diverse in size, horizontally spreading, flat or only slightly recurved, smooth and deep green on the upper side, yellowish glaucescent beneath; young infrutescence erect, green, with globose berries. In dry fertile soil along a wooded ridge bordering the Baracatan creek at 1250 feet. The Bagobos call it "Cagong."

Represented by number 11190, *Elmer*, Todaya (Mt. Apo), Mindanao, July, 1909.

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LEAFLETS OF PHILIPPINE BOTANY

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SAPOTACEAE FROM SIBUYAN ISLAND

BY

A. D. E. Elmer

—o—

PALAQUIUM Blco.

Palaquium bataanense Merr. in Govt. Lab. Publ. XVII; 44, 1904.

Field-note:—Erect tree; stem 2.5 dm. thick, 8 m. high, terete; its main branches arising from below the middle, freely rebranched and widely spreading, twigs ascendingly curved; wood moderately hard, sappy white, odorless, slightly bitter; bark checked, grayish brown mottled, contains latex, smooth on the branches. Leaves thickly coriaceous, shiny, very deep green above, much lighter beneath, horizontal, recurved toward the apex. Flowers odorless, in small clusters, mainly in the axils of fallen leaves, the greenish pedicels recurved toward the distal end; calyx of the same color; the 6 segments of the corolla green, its short tube whitish; stamens double the number, their filaments whitish and inserted upon the throat of the corolla; style of the same color, ovary more yellowish; anthers yellowish white. In compact red soil covered with sod in light woods at 500 feet along the Pauala river.

Represented by number 12126, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, March, 1910.

Palaquium theoidea Elm. n. sp.

Small gnarly tree; stem terete, crooked, 15 to 20 cm. thick, 8 m. high; branches mostly above the middle, relatively short and crookedly rebranched, the numerous twigs suberect and quite bendable; wood hard, tasteless, ordorless, reddish except the thin sapwood; bark thick, yellowish gray mottled, minutely checked, reddish brown beneath the epidermis, with latex. Leaves alternate, copious, very rigid, ascending, flat, much lighter green or even glaucescent beneath, glabrous, blades 8 cm. long, 4 cm. wide across the middle or a trifle above it, elliptic or obovately oblong, entire margins subinvolute in the dry state, base obtuse to cuneate, apex rounded to short obtuse, the young ones short silky brown hairy beneath; midvein very prominent beneath, drying brown, the 9 to 11 slightly ascending pairs obscure, reticulations obsolete; petiole also brown and glabrous, 1 to 2 cm. long, thickened toward the base, usually glaucescent; stipule deciduous, 7.5 mm. long or longer, acuminately pointed, short hairy on the outside, rigid. Flowers not seen; fruits upon erect stout pedicels at least 2 cm. long, solitary, axillary or from the fallen leaf axils, smooth, subglobose, 2 cm. thick, hard, green, with a prominent 3 mm. long point, 3 to 5-ovuled, subtended by a double series of bracts 3 in a whorl; outer series thick, the segments obtuse, united below the middle, the inner series thinner, brown, .broadly obtuse or rounded, also united below the middle and to the outer series.

Type specimen 12515, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910.

Discovered on a wind swept wooded ridge at 4750 feet in moist red clay mixed with stones.

Somewhat resembling *Vidal's P. cuneatum.*

Palaquium dubardii Elm. n. sp.

A medium-sized tree; stem 3 dm. thick, 10 m. high; its main branches arising from below the middle, widely spread-

ing, ultimately numerously rebranched; the twigs comparatively short, suberect, forming dense masses at the ends of the branches, roughened by the remaining short tubercles of the inflorescence; wood hard, reddish toward the center, without odor or taste; bark thick, mottled, more or less checked, reddish brown beneath the epidermis, containing latex on the inner side. Leaves alternate, ample at the ends of the occasionally glaucous tips, ascending, rigidly coriaceous, shining green above or on the folded side, much paler green beneath, drying brown, obovately oblong, 1 dm. long, 4 cm. wide a trifle above the middle, the entire margins subinvolute, cuneate at the base, obtuse or rounded and emarginate at the apex; midvein prominent beneath, the 7 to 9 lateral ones ascending, obscure, with the tips more or less forked and united, reticulations obsolete; petiole 1 to 1.5 mm. long, glabrous, usually glaucous; stipule 5 mm. long, acute, thick, deciduous. Flowers in small clusters upon raised tubercles, numerous, in the lower leaf axils but usually from the fallen leaf axils immediately beneath the foliage; pedicels green, divaricate or recurved, brown with a very dense and short tomentum or occasionally glaucous along the upper side, 1.25 cm. long; calyx glabrous, 6-segmented; the outer series of 3 thick, valvate; the inner thinner and imbricate, all united below the middle, the apex of the outer ones obtuse, that of the inner ones rounded, persistent; petals 6, very early falling, greenish, ovately oblong, very imbricate, acute apex; stamens 12, subsessile; anthers widest at the base, acuminately elongated, bilobed at the base, basifixed; the short filaments inserted upon the base of the inner petals; ovary puberulent, giving rise to a glabrous 7.5 mm. long persistent style; fruit globosely ellipsoid, 1.25 cm. long, 2 or 3-seeded, hard, green, smooth.

Type specimen 12553, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910.

A fine tree in red soil with a gravelly subsoil on wooded banks along the Pauala river at 750 feet. Dedicated to *M. Marcel Dubard* who recently published in the "Bulletin du Museum d'histoire Naturelle" a critical review of most of our Philippine species, describing one or two new ones. The natives or Visayan call it "Molato."

This *Palaquium* is very near to *P. lanceolata Blco.* and *P. merrillii Dub.*, but the thicker leaves, more numerous and quite obscure nerves mark it as distinct. Neither can it be referred to *P. cuneatum Vid.*

SIDEROXYLON Linn.

Sideroxylon attenuatum DC. Prod. VIII; 178, 1844.

Field-note:—A medium-sized tree; stem 2 dm. thick, 10 m. high, branched from the middle; twigs slender, quite numerous, somewhat drooping and with suberect tips; wood moderately hard and brittle, sappy white, without odor or taste; bark thin, obscurely but densely checked, grayish mottled, juicy and white on the inner side, light brown beneath the epidermis. Leaves chartaceous, ascending, flat, dark sublucid green above, silvery white or canescently green beneath, drying green. Flowers upon recurved greenish stalks, green. In woods of moist soil of limestone outcropping, near mangrove swamps. Called "Tabigey" by the Visayan on Sibuyan.

Represented by number 12452, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, May, 1910.

Based on *Cuming* 1243.

Sideroxylon stenophylla Merr. in Philip. Journ. Sci. III; 258, 1908.

Field-note:—Large erect tree; stem 8 dm. thick, 20 or more m. high; branches toward the top only, relatively short and crookedly rebranched; wood moderately hard, dingy white, without odor or taste; bark thick, brittle, smoothish, conspicuously mottled with gray and white, the inner portion containing latex. Leaves ample along the ascending twigs, chartaceous, mostly descending, smooth and similarly sublucid green on both sides, folded and with recurved apices. Young fruits scattered along the branchlets or in the lower leaf axils, ascending, tomentosely grayish green, 5-celled, 5-ovuled. In fertile moist soil near limestone outcroppings of woods near the coast. The native Visayan call it "Salong."

Represented by number 12411, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, May, 1910.

Although ours is in mature flower and the type only in mature fruit, the specimens are otherwise a perfect match.

Sideroxylon fragrans Elm. n. sp.

A medium-sized tree; stem 10 m. high, 4.5 dm. thick; main branches arising from above the middle, freely rebranched, the ultimate ones quite slender and suberectly curved; wood light, moderately hard or soft, fine to work, white on the outside, reddish toward the center, odorless and tasteless; bark rather thick, grayish and brown mottled, smoothish, with latex. Leaves alternatingly crowded toward the ends of the pulverulent grayish twigs, chartaceous, horizontally spreading, very shallowly folded upon the upper slightly greener surface, drying much paler green beneath, glabrous, the entire margins involute when dry, apex abruptly acute to acuminate, base obtuse to subcuneate, oblong, the longer blades 1.5 dm. long, nearly 5 cm. wide across the middle or just above it; petiole ascending, terete, finely puberulent, up to 5 cm. long; midvein dirty brown, conspicuously raised beneath, glabrous or puberulous along the sides; the conspicuous 13 to 16 lateral pairs straw color, oblique and subparallel, ascendingly curved at their ends, cross bars fine and obscure; bud bracts acute, 1 cm. long, brown, hairy; flowers from the leaf axils mainly, fragrant; pedicels yellowish brown, ascendingly spreading, occasionally recurved, 2 to 3 cm. long, striate in the dry state, subtended at the base by small rather thin bracts, densely brown pubescent; calyx similar in color and vestiture, composed of 5 imbricated segments which are more or less united at the base, fulvous pubescent on both sides, broadly elliptic to subrotund, obtuse at the apex, 5 mm. long; corolla creamy white, 7.5 mm. long, its tube very thick, glabrous, 5-lobed down to the middle; lobes truncately rounded, separated by widened sinuses; fertile stamens 5, opposite the corolla segments, alternating with a series of 5 staminodes; filament subterete, glabrous, 1 mm. long; anther ovately ellipsoid, 1.5 mm. long, basifixed, laterally dehiscent, bilobed at the base; staminodes petaloid, also glabrous; the conically flattened ovary hairy; style short, thick, glabrous, cylindric, terminated by 5 small knob-like stigmas; fruits in

pairs from the leaf axils mostly, nearly 2 cm. long, ellipsoid, usually with 1 flattened stone-like seed, green to bright red and dark purple on the same tree.

Type specimens 12190 in flower and 12307 in fruit, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

A fine appearing tree in fertile humus covered soil on densely wooded banks of the Sinuban creek at 750 feet for the flowers; in similar soil on the forested ridge at 1500 feet for the fruit. In the one case it was called by the natives "Bagomaho," in the other "Topok."

Sideroxylon pittosporifolium Elm. n. sp.

Small tree; stem 2 dm. thick, 8 m. high; the main branches arising from the middle, spreading, the ultimate ones lax and usually with ascending tips; wood sappy white, moderately soft, distinctly sweet, odorless; bark smoothish or mostly checked, the inner side with but little milky sap. Leaves subcoriaceous, ascending or horizontal, quite numerous, glabrous, sublucid upon the upper folded surface, similarly dark green on both sides, recurved toward the sharply acuminate tip, base cuneate to attenuate and gradually extended along the petiole, the entire margins slightly involute in the dry state, drying green, blades 1 dm. long, nearly 4 cm. wide across the middle, lanceolate to oblong, alternatingly clustered toward the ends of the green sparsely puberulous twigs; petioles 1 cm. long, green, puberulent especially along the under side; bud bract 5 mm. long, acute, brown, slightly pubescent; midvein prominent, the lateral ones 15 to 20 on each side, equally visible on both sides, submarginally united, connected with relatively prominent reticulations. Inflorescence fascicled in the axils of the leaves, pale green, odorless; pedicels spreading, short yellowish canescent, 5 to 7.5 cm. long, subtended by minute deciduous brown bracts; calyx imbricate, composed of 5 more or less free segments, the outer 3 similarly pubescent, the inner subglabrous, 6 mm. long, ovately elliptic, rounded at the apex; corolla comparatively delicate, 4 mm. long, its tube short and broad; segments 5, broad and trun-

cate, 2 mm. long, separated by rather wide sinuses; stamens 5, inserted upon the middle of the corolla opposite the segments; filaments 1 mm. long, glabrous; anthers as long, acute at apex, bilobed and attached at the base; staminodes also 5, flattened, alternating with the corolla segments; ovary conically flattened, hairy; style columnar, striate, glabrous except the few hairs at stigma, scarcely longer than 2 mm.; ripe fruits suberect, upon 7.5 mm. long stalks, subtended by the persistent calyx, terminated by a mucronate point, 2.5 cm. long, triangularly terete, 3-seeded, greenish streaked with purplish brown; mature seeds solitary, usually 2 but occasionally 3, very smooth and maroon brown except the yellowish ventral edge.

Type specimen 12552 in flower and 12318 in fruit, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April and May respectively, 1910.

This small slender tree was collected on wooded banks of the Pauala river at 750 feet, in red soil with a stony and gravelly subsoil, and along the Sinuban creek under similar conditions. The fruiting specimen was called "Leter" by the local Visayan.

My number 12086 from the same locality is not quite typical. Superficially similar to *S. stenophylla Merr.* from Mindoro. Foliage similar to that of *Pittosporum*.

Sideroxylon gitingensis Elm. n. sp.

A very slender tree; stem 10 to 15 cm. thick, 10 m. high; main branches toward the top, rather short, numerously rebranched, with suberect glabrous twigs which in the young state is fulvous brown pubescent; wood dingy white, quite hard, odorless and tasteless; bark smooth, mottled, with latex. Leaves copious, ascending, mostly flat, glabrous on the upper shining green surface, paler green and minutely hairy beneath in the young ones, subchartaceous, the entire margins subinvolute in the dry green state, oblong or the smaller ones oblanceolate, apex short acute or merely obtuse, base cuneate or obtuse, the average blades 1 dm. long, at least 3 cm. wide across the middle or a trifle above it, alternatingly crowded

toward the ends of the branchlets; midvein conspicuously raised beneath, yellowish brown tomentose in the young state, wearing glabrous, the 7 to 11 lateral ascendingly arched pairs also prominent beneath, reticulations fine and quite evident beneath; petiole glabrous, 1 to 1.5 cm. long. Inflorescence fascicled in the leaf axils of the young apical portion of the twigs, odorless; pedicels 1.25 cm. long, longitudinally ridged, fulvous pubescent, spreading, subtended by small bracts; calyx similary pubescent, thick; segments or sepals only 4, imbricate, ovately rounded, 4 mm. both dimensions; corolla delicate, creamy white, 4.5 mm. long, the thick tube 3 mm. long, glabrous; segments 5, broad, truncate at apex; stamens 5; filaments inserted 1 mm. from the base, opposite the corolla lobes, nearly 2 mm. long, glabrous; anther bilobed at the base and basifixed, 1.25 mm. long, ovoidly elliptic; staminodes inserted at the sinus, flat, notched at the apex; ovary dome-shaped, villous, bearing a glabrous columnar 2.5 mm. long style; fruits not seen.

Type specimen 12332, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

Discovered in moist shale rocky soil on a steep wooded incline, near the ridge summit at 1750 feet on the trail to España.

A near ralative of *S. angustifolium Merr.*, but when the specimens are compared the larger, differently nerved and shaped leaves at once mark it distinct.

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LEAFLETS OF PHILIPPINE BOTANY

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URTICACEAE FROM THE VICINITY OF MOUNT APO

BY

A. D. E. Elmer

—o—

The following *Urticaceae* were chiefly collected in two localities in the vicinity of mount Apo. First, the Baruring river gorge or canyon at about 3500 feet altitude. Along this river were collected the majority of rank succulent species which under favorable conditions formed dense masses in wet stony soil of narrow flats near the river. *Pilea robinsonii Elm.*, *Elatostema whitfordii Merr.*, *Elatostema baruringense Elm.* and a species of *Pellionia* are striking local examples. The Sibulan river on the other hand flows nearly parallel at that altitude and is relatively poor in this kind of vegetation, possibly due to the swifter flow and greater rise and fall of water during heavy rains. The second and most interesting locality is along the Cati creek from above its series of falls into the Sibulan river up to 7000 feet or higher on the northeast side of Apo, and which flows through the dense moss laden forests. Along this creek I spent three days of most profitable collecting. On the last day I managed to work up to 6500 feet where the bowlders were heavily strewn along the creek bed and the rocky cliffs were narrowly banking the stream. Here the herbaceous species were finer and more abundant in kind as well as in individuals than I had ever seen before. Everywhere they matted the rocks and carpet-

ed the seepage rocky flanks or precipitous cliffs. With the mosses and scale-mosses, and the beautiful trailing *Nertera depressa Banks* with its bright shining red fruits, they formed soft masses knee deep. It seemed as though I was collecting only *Urticaceae* and my intentions were to spend a few more days exploring these beautiful little known plants, but continuous rains interfered. The rich herbaceous flora on the steep declivities along the falls of the Cati I was unable to touch.

The following thirty-one species, therefore, represent only a very incomplete enumeration of the actual number of species existing in this region, and it is not surprising that more than one half of them are new to science. Three of the novelties are in manuscript by *Dr. Robinson* who will publish them in his forthcoming monograph of Philippine *Urticaceae.*

URTICA Linn.

Urtica bullata Blm.

Field-note:—A low suffrutescent perennial; stem less than 1.25 cm. thick, 1 to 2 m. high, several from the same base, ascending or spreading and supported by herbaceous jungles, terete, greenish gray, sparingly rebranched, covered all along with vestiges of the nettles; branchlets erect or suberect, beset with nettles; leaves soft membranous, horizontal, flat, darker green on the upper side, on both sides beset with nettles; inflorescence laxly spreading, greenish. "Latong" is the name applied to it by the Bagobos.

Represented by number 11583, *Elmer*, Todaya (Mt. Apo), Mindanao, August, 1909.

LAPORTEA Gaud.

Laportea gracilipes Elm. n. sp.

Small, erect and slender tree, 5 m. high, with a nearly 1 dm. thick stem; limbs lax and slender, somewhat drooping, with green twigs; wood soft, whitish, odorless; bark smooth, yellowish gray. Leaves flat, the short abruptly

acute tips recurved, alternatingly scattered toward the ends of the smooth branchlets, oblong or subelliptic, the average blades 16 cm. long, 6 cm. wide across the middle, base abruptly obtuse or rounded, apparently glabrous, the entire margins slightly involute in the dry state, turning greenish brown while curing, thinly coriaceous, much deeper green on the upper side; midvein conspicuous beneath, with 5 to 7 arcuate lateral pairs whose tips are more or less united, all glabrous and dark brown beneath, the cross bars and reticulations quite faint; petiole 3 to 5 cm. long, glabrous; bud bracts 1 cm. long or less, brown, glabrous or only slightly strigulose along the margins, gradually tapering to an acute point. Flowers not seen; infrutescence solitary from the leaf axils, pendulous, purplish, provided with whitish stinging hairs, 2 to 3 dm. long, branched, from below the middle; branches not numerous, dichotomously rebranched; pedicels as long as 1 cm. but frequently much shorter or even subsessile, flattened, subtended by few brown linear segments with blunt points and scarcely exceeding 1 mm. in length, at the distal end flattened out into a receptacle; receptacles fleshy, blue, with a few spicules, 4 mm. across, apiculately fringed along the upper margin; seeds several, set side by side along the upper side of the receptacle, smooth, green, lenticular, 2 mm. wide from the side view, sessilely attached to the upper basal edge, the lower outer edge bearing an ascendingly curved brown slightly puberulent 2.5 mm. long style.

Type specimen 10499, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, May, 1909.

A graceful tree-like undershrub in fertile humus covered soil of a densely forested oak flat at 4000 feet. It was repeatedly noticed both along the trail from Todaya to Talon and Baclayan. Very pretty when in full fruit! It is known to all Bagobos as "Sigmit." The natives unmistakably know this even as a young plant with its first leaves. When they travel off trail through the woods or forests they instinctively detect its foliage as if it were a venemous reptile. In this same region the forests are full of fine rather low climbing or sprawling rattans whose spiny leaf rachises dangle everywhere—but these the Bagobos do not mind at

all when the "Sigmit" is to be reckoned with at the same time. I have several times been stung by it, twice very hard, and I can testify of it being by far the most excruciating stinger so far encountered in these islands. Some few years ago I was severely stung by a *Laportea* on mount Banahao, but which proved mild in comparison. The sting first caused a slight swelling or at least a reddening of the skin on the back of my hand and which looked rather bright and felt oily. Within an hour or two the pain was at its worst and distinctly ran in streaks. It then gave way to cessations of almost painless moments until after several hours or a day or two I was almost unconscious of the pain unless my hand was touched in the affected region which quickly aroused the pain for short periods only. After few to several days the sting had to be pricked in orderd to stir up any remembrance of it. A week or ten days later the stinging sensation had entirely disappeared. The natives have no remedy except to spit on the affected portion or place a putty of wet earth over it, which simply soothes the patient but does not draw out the pain.

Its leaves and slender infrutescence are quite different than in *L. mindanaense Warb.*

Laportea venosa Elm. n. sp.

Tree 7 m. high, 2 dm. thick; branches rather slender, the ultimate ones suberect, glabrous, grayish in the dry state, roughened with old leaf scars and more or less angularly ridged longitudinally, 0.75 of a dm. thick. Leaves alternate, few to several crowded toward the ends of the branchlets, glabrous, oblong, turning brownish while drying, the normal blades 2 dm. long, 7.5 cm. wide across the middle, entire margins involute in the dry state at least, gradually tapering to the acute or acuminate point, subcoriaceous, base rounded or abruptly obtuse; petiole 2 to 4 cm. long, stout, glabrous; midvein prominent from both sides, with about 8 arcuate lateral pairs, all glabrous and olivaceous brown in the dry state, the reticulations relatively conspicuous; bud bract 5 mm. long, quite rigid, subglabrous, triangularly oblong. Inflorescence staminate, from the leaf axils or from their scars beneath the foliage, about

5 to 8 cm. long, paniculately branched from below the middle; peduncle solitary or few from the same axil; branchlets divaricately spreading, glabrous; flowers in small sessile glomerules at the point of branching, subtended by short reddish brown persistent bracts, bracts less than 1 mm. long, very finely ciliate along the margins; perianth without hairs, but similar in color to the bracts, 2.5 mm. long, united toward the base, the segments triangularly acute, sessile, in the bud state subglobose; stamens as many, opposite the segments; filaments free, glabrous, flattened except toward the apex; anther broadly elliptic, 1 mm. long, fully as wide, emarginate at both ends, attached to the middle portion; pistillode clavate, erect, 1.5 mm. long; pistillate flowers and fruits not seen.

Type specimen 11948, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, October, 1909.

Quite a slender tree on the wooded summit of mount Burebid at 4000 feet. The Bagobos call it "Sigmit" which is also the name given to the preceding new species.

These male specimens are quite different from all other Philippine species by the character of the leaves.

PILEA Lindl.

Pilea sylvatica Elm. n. sp.

Subsucculent herb; stem 1 to 2 m. high, sparingly rebranched; the branches strictly ascending, all more or less swollen between the nodes, subterete, dark green and streaked with purplish brown. Leaves slightly ascending, the acuminate tips recurved, shining on both sides, drying dull green, deeper green above, with cystoliths on both sides, soft membranous, delicately thin in the dry state, the average blades 12 cm. long, 5.5 cm. wide below the middle, ovately oblong, the rounded base subentire, otherwise crenately toothed clear to the apex, the larger teeth with a small one on the lower side, glabrous; veins 3 from the base, the lateral pair extending two thirds the length of the blade; the secondary lateral ones 9 to 11 on each side of the midvein, nearly at right angles, reticulations coarse and faint; petioles 3 to 7 cm. long, slender, glabrous; stipule membranous

and foliaceous, glabrous but covered with blackish cystoliths, oblong, roundly obtuse at apex, quite broad at the base, 1.5 cm. long. Inflorescence clustered in the lower leaf axils, cymosely spreading; branches glabrous, arising from near the base, 1 to 2 cm. long in the fruiting state, flattened or more or less winged, green, glomerules subtended by greenish or hyaline bracts 1.5 mm. long and relatively broad, covered with cystoliths, the inner bracts much smaller and narrower, all glabrous; pedicel 0.5 mm. long, hyaline; perianth greenish and similarly marked with cystoliths, globose in the bud state, 1.5 mm. in diameter, minutely 4-toothed at apex, ultimately 4-parted; stamens 4, opposite the segments, strongly inflexed in the bud; anther deeply bilobed, the brown filaments glabrous; pistillate flowers sessile or upon very short pedicels in the fruits, in small glomerules irregularly scattered; perianth greenish, subequal, 0.75 mm. long, 3-lobed, acutely pointed, united toward the base; achene flattened, ovately oblong from the side view, 1 mm. long, subtended by 3 basal glands, tuberculately glandular; stigma papillose, upon a very short neck, brown when dry.

Type specimens 11698 pistillate and 11547 staminate, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September and August respectively, 1909.

The former number of this sylvan species was collected at 4000 feet in a humidly forested basin and was named "Sigbut-tala" by the Bagobos; the latter number was collected on seepage ledges along the Cati creek at 5750 feet and was called "Roman" by the same natives.

Very close to *P. angulata Blm.*, but apparently different in a number of minor characters.

Pilea robinsonii Elm. n. sp.

Rank succulent herbs; stems green, nearly 2 cm. thick, irregularly bulging between the nodes, sparingly rebranched, reclining and forming tangled thickets, with a very strong peppery odor; branches erect or suberect bearing leaves toward the top only. Leaves ascending, flat, opposite, the slender acuminate tips recurved, dark olive green on the upper side, much paler or yellowish green beneath,

comparatively thin, coriaceous, turning sordid brown in the dry state, glabrous, elliptic or elliptic oblong, entire toward the obtuse base, otherwise regularly serrately dentate, the normal blades 17 cm. long by 7 cm. wide across the middle, the basal one half more tapering, densely covered on both sides with minute cystoliths; midvein prominent and dull straw brown beneath especially so below the middle, with a pair of lateral veins arising near but not at the base which extend 1 cm. within the margin clear into the abrupt apical point; cross bars quite conspicuous and alternating with minor ones, at right angles, curved, all glabrous; petioles stout, smooth and glabrous, 5 cm. long; stipule glabrous, short and intrapetiolar, on the sides bluntly dentate. Inflorescence and infrutescence axillary, cymosely branched from near the base, at most 5 cm. long in the fruiting state; branches compressed when dry, glabrous, rather delicate and slender; pistillate flowers in small glomerules, sessile or stout pedicellate; perianth lateral, glabrous, 3-lobed, the keel-shaped middle one 1.25 mm. long, rather thick and with a blunt apex, the sharply pointed lateral ones less than one half as long; achene lenticular, 1 mm. across, with a fine row of glands on the sides along the edges, subtended at the base by 3 glands; stigma minutely papillate, upon a short and rather thick neck; staminate buds compressed, globose, 1.25 mm. thick, glabrous, minutely apiculate, parting into 4 segments; stamens as many as there are segments; anther broadly elliptic, inflexed in the bud, deeply bilobed, nearly 1 mm. long; the flattened filaments glabrous.

Type specimens 10487 pistillate and 11758 staminate, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, May and September respectively, 1909.

Collected the pistillate number in rich moist soil of humid forests at 3750 feet along the Baruring river. The staminate specimens were gathered at the junction of Colon creek with the Baruring at a higher elevation, forming dense clumps about clear thermal springs or pools on sandstone basins. The former is called "Buas," the latter "Salimbagun" by the Bagobos. Dedicated to *Dr. C. B. Robinson* who has materially aided me in the preparation of this article.

Pilea apoensis Elm. n. sp.

Succulent bi-or perennial; stem somewhat woody at the base, terete, greenish, sparingly branched or several stemmed from the base, 1 to 2 m. high; branchlets slender, also succulent, turning reddish, 5 mm. thick, more or less angular, glabrous. Leaves horizontally spreading, slightly recurved, thinly coriaceous, very dark green and shining so beneath, opposite, scattered along the branchlets but usually more abundant toward their ends, exceedingly variable in size, in the dry state nearly black especially the upper side, glabrous, only the lower surface with cystoliths, margins entire toward the obtusely rounded base, apex mostly acute or the largest ones acuminate, usually slightly inequilateral at the base and obscurely falcate toward the apex, the larger blades 8 cm. long, 3 cm. wide across the middle, elliptic oblong; veins 3 from the base, the lateral basal pair extending nearly to the apex; the secondary lateral ones from 9 to 11 on each side of the midvein and at right angles to it, usually terminating into the basal lateral pair, reticulations quite evident, all dull brown and smooth; petiole glabrous, slender, 4 cm. long in the larger leaves, much shorter in the smaller ones; stipules 1.5 mm. long or less, brown, smooth, oblong, with rounded apices or lobulate, the axillary bract acute. Inflorescence an axillary cyme, 1 to 2 cm. long in the fruiting state; peduncle usually with 1 or more minute bracts, glabrous, dichotomously branched toward the top, at the base subtended by small bracts; branches short, sparingly rebranched, more or less flattened, the flowers and fruits arranged along the upper side, glabrous; the staminate flowers similarly clustered; perianth before opening subglobose, 1.5 mm. across; segments glabrous, separating into 4 parts nearly to to the base, subelliptic, abruptly terminated into an acute or mucronate point; stamens opposite the segments; filaments flattened, glabrous, inflexed in the bud; anther 1 mm. long, bilobed, broadly elliptic; pistillate glomerules subtended by minute bracteoles, unequal in size; perianth lateral, glabrous, 3-lobed, united at the base, apices sharply acute, the middle or larger one 0.75 mm. long; achene lenticular, 1.25

mm. long, glandularly punctate; stigma sessile, slightly lateral, composed of several papillae.

Type specimen 11551, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, August, 1909.

Gathered from wet moss covered ledges along the Cati creek at 5750 feet of mount Apo above its series of falls into the Sibulan river. "Sogalum" is the name given by the Bagobos. Rare!

LECANTHUS Wedd.

Lecanthus peduncularis (Wall.) Wedd.

Field-note:—Delicate succulent creeping herbs and forming dense patches; stem, petiole and peduncle light or paler green; leaves soft, membranous, darker green upon the upper shallowly conduplicate surface and with recurved tips, horizontal or slightly ascending; inflorescence greenish, the anthers with a shade of pink. Upon moist moss covered roots and rocks along the Cati creek at 5750 feet of mount Apo. This trailer the Bagobos call "Palauay."

Represented by number 11512, *Elmer*, Todaya (Mt. Apo), Mindanao, August, 1909.

PROCRIS Comm.

Procris pseudostrigosa Elm.

Field-note:—Scandent and forming numerously branched masses; stem smooth, grayish, 2.5 cm. thick; twigs slender, descending, upwardly curved toward their tips; wood soft, odorless and tasteless, reddish beneath the sappy white outer portion, the balance or central mass yellowish; leaves descending, smooth on both sides, flat, dark green above, much paler beneath; male inflorescence pendulous from the branchlets mostly, dirty white; female inflorescence green, dense, axillary; flowers odorless, anthers of a light white color, shedding its pollen with a force. Quite common in the rainy forested basin at 4500 feet. The densely interlaced masses entirely encicle small tree trunks a few to several meters from the ground. "Rader" is the vernacular name given to it by the Bagobos.

Represented by number 10746, *Elmer*, Todaya (Mt. Apo), Mindanao, May, 1909.

PELLIONIA Gaud.

Pellionia (n. sp. in ms. by *C. B. Robinson.*)

Field-note:—Large and succulent tufts; stems many from the same root cluster, ascending and numerously rebranched, green, succulent, the ranker ones 7.5 cm. in diameter at the base, from 1 to 3 m. high; leaves quite thin, flat, descending, paler beneath; inflorescence erect, ascending, the pistillate pale green, the staminate dull pink; the buds of the stamens bursting with a force thereby scattering the pollen in a cloud; the 5 filaments and anthers only slightly tinged with red. Very common and in favorable places forming dense jungles in moist fertile soil or upon rotten stumps or about bases of large trees in a humid forested basin at 4000 feet. This same species occasionally became epiphytic and formed dense clumps about its support. The Bagobos call it "Dadar."

Represented by number 10466, *Elmer*, Todaya (Mt. Apo), Mindanao, May, 1909.

ELATOSTEMA Forst.

Elatostema whitfordii Merr.

Field-note:—Large rank tufts; stems easily breaking, succulent, green, smooth, obscurely fluted, at the base usually reclining, ultimately erect, 2.5 to 7.5 cm. thick near the ground and gradually decreasing in thickness, about 2 m. high; leaves limp, in alternatingly distichous rows, suberect, more crowded toward the apex, dark green except the lighter lower side, the young ones very light green; infrutescence upon greenish white plates usually of a lobed squarrish shape, arranged along the stem on the upper side and even in the leaf axils; the short green pedicels usually recurved, thereby turning the fleshy receptacle away from the stem; seeds minute, brown, numerous; bracts very short or obsolete. In exceedingly moist earth among rocks in deeply shaded ravines along the Baruring river at 3500 feet.

Represented by number 10709, *Elmer*, Todaya (Mt. Apo), Mindanao, May, 1909.

So far only the staminate flowers of this species are known from mount Mariveles, the topotype.

Elatostema (n. sp. in ms. by *C. B. Robinson.*)

Field-note:—Succulent herb; stem smooth, brown, terete, fleshy, sparingly branched, ascending or ultimately recurved; leaves descending, membranous, dark green above, much paler green beneath; inflorescence greenish white, arranged in the leaf axils along the upper side of the branches. In deep wet moss covered ground, at the summit or 8250 feet on mount Calelan. The Bagobos called it "Rodert-ta-lomot" meaning a moss-like "Rodert" or upon mosses.

Represented by number 11343, *Elmer*, Todaya (Mt. Apo), Mindanao, August, 1909.

Elatostema apoense Elm. n. sp.

Succulent terrestrial tufts, forming more or less scattered patches; stems several, ascending, recurved toward the top, terete, sparingly branched from the middle, dull green or purplish, longitudinally ridged, 3 dm. high, dirty yellowish pubescent. Leaves crowded toward the top, thinly coriaceous, of a pleasing bright green on the upper glabrous side, much paler green beneath and also glabrous except the nerves, densely provided with cystoliths on both sides, distichously alternating, flat, horizontal or descending; the larger blades nearly 5 cm. long, falcately curved upwardly, 5 mm. wide, extending into sharply acuminate or caudate points, sessile, the obtuse base entire and obliquely inequilateral, margins otherwise dentately serrate; the lower leaves more scattering, much shorter and wider; midvein conspicuous beneath, brownish pubescent, with 5 to 8 divaricate lateral ones whose ends arch and are connected; stipules copious, 5 to 8 mm. long, linear, setaceously pointed, pale green, with cystoliths on the back. Staminate heads 6 mm. across, flattened in the leaf axils; involucral bracts 4 mm. long, the outer 2 to 3 rather broad, with cystoliths and hairy on the dorsal side, the narrow inner ones with fine hairs along the apical margins; perianth upon a 2.5 mm. long and hyaline stalk, very

thin; the 5 lobes shorter, obovate, minutely pointed at the apex; anthers deeply bilobed, upon very slender and hyaline filaments, as many as there are perianth segments; pistillate flowers and fruits not seen.

Type specimen 11793, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September, 1909.

Inhabiting rich moist humus covered soil in dense forests at 4000 feet, south of the Baruring river. The Bagobos call it "Rader."

Related to *E. lineare Stapf* from mount Kinabalu, British North Borneo.

Elatostema longipedunculatum Elm. n. sp.

Stem fleshy, terete, greenish or turning red, creeping and branched, the free ultimate branchlets descending but with suberect tips, 1.25 cm. thick; the branchlets thinner, the larger ones 1 m. long, subglabrous or with few scattering yellowish hairs. Leaves alternatingly scattered, horizontal or descending, flat, submembranous, dull green above, much lighter beneath, sordid green when dry, nearly equal, the larger blades 1 dm. long, 3 cm. wide across the middle or a trifle above it, subsessile or upon a short puberulent petiole, oblong or the smaller ones broadly oblanceolate, glabrous, without or with only a few scattered cystoliths on the upper side, the abruptly obtuse base entire and obliquely inequilateral, gradually tapering into the slender acuminate apex, rather coarsely and evenly serrately dentate from below the middle, slightly falcate and inequilateral, the upper and narrower side nearly straight, the lower gracefully curved and wider; midvein slightly curved, the lower side with about 7 ascendingly arched nerves, the upper side with only 5 similar ones, the larger lateral nerves usually forked toward their ends, all more or less yellowish brown puberulent, reticulations very faint; stipules brown, glabrous, deciduous, laciniately linear, up to 1 cm. in length; peduncle usually solitary from the uppermost leaf axils, greenish, very slender, strictly ascending, 2.5 to 5 cm. long or even longer, strigose toward the distal end, otherwise nearly glabrous; head greenish white, flattened, 7.5 mm. across;

outer bract lobes nearly 5 mm. long, triangularly acute, with few fine hairs especially along the margins, the inner ones smaller; staminate flowers subtended by small bracteoles; perianth delicate, short stipitate, 1.5 mm. long, ciliate especially above the middle, the lower one half united, the segments with apiculate points; anthers 5, deeply lobed, upon short thread-like filaments; pistillate flowers and fruits not seen.

Type specimen 11593, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, August, 1909.

Gathered on seepage ledges along the Cati creek at 6000 feet on the east side of mount Apo. Forming dense masses, with the free pendulous ends far extending. Very pretty! Called by the Bagobos "Rader."

Quite distinct from all other known Philippine species.

Elatostema inaequifolium Elm. n. sp.

A delicate creeper; stems relatively succulent, branched, angularly terete, glabrous, green or turning pale brown, branched, the ultimate ones erect or suberect, taking roots at the nodes. Leaves horizontal, soft, membranous, flat, dark green and usually covered over by cystoliths on the upper side, much paler green beneath, very unequal in size, the basal ones quite small, oval, obtuse to rotund, those toward the erect ends fewer and much larger, glabrous, bright green in the dry state, the larger ones ovately lanceolate, 1.5 to 2 cm. long, 7.5 mm. wide below the middle, the abruptly obtuse base entire and inequilateral, apex acute to acuminate and terminating into a rather blunt point, the middle sides with few dentate serratures, usually upon a short but distinct glabrous petiole, midvein quite conspicuous; the basal lateral pair running along the margins, always evident toward the base, the 1 to 2 lateral ones arising from the midvein above the middle and are usually obscure; stipule green, scarcely exceeding 1 mm. in length, also glabrous. Peduncle 7 mm. long, green, filiform, smooth, ascending, usually solitary from the uppermost leaf axils; involucral bracts few, unequal, smooth, the larger one distinctly foliaceous, 2.5 mm. long, 1.5 mm. wide, triangularly oblong, the inner ones smaller and hyaline,

all glabrous; staminate flowers several, whitish, upon glabrous, similarly colored and 1.25 mm. long pedicels; perianth also glabrous, segments 4, decussate, becoming free nearly to the base, elliptic, 1.5 mm. long, minutely mucronate; stamens 4, opposite the segments, inflexed in the bud; filaments hyaline, as long as the perianth; anthers deeply bilobed, 1 mm. long; fruiting heads sessile, the outer bracts greenish, the inner ones spatulate and ciliate; pedicels as long as those bearing the staminate flowers, bearing a single seed; achene 0.75 mm. long, fusiform from the side view, brown, surrounded by a utricle, subtended by 3 or 4 lobulate phlanges.

Type specimen 11545, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, August, 1909.

Growing with dense masses of mosses and scale-mosses upon wet rocks along the Cati creek east of mount Apo at 5750 feet or just above its first fall.

Its affinities lie with *E. microphyllum Elm.* and other related species from mount Banahao.

Elatostema philippinense Elm. n. sp.

Soft, dense masses; stems succulent, 3 dm. long or longer, creeping, ultimately bearing numerous branches, 7.5 mm. thick, terete, glabrous, dark green, well interlaced; branches ascending, their tips frequently recurved, occasionally rebranched, glabrous except the sparsely strigose leafy portion, equalling the stems in length. Leaves alternatingly scattered mostly toward the top, the few lower ones reduced, ascending or horizontal, flat, soft membranous, deep green above, much lighter green beneath, the natural color beautifully preserved in the dry state, glabrous, without cystoliths, apex acuminate to caudate, sessile, the very oblique base bluntly obtuse, the lower or wider side conspicuously curved, the upper nearly straight, dentately serrate from the base clear to the tips, the larger serratures doubly serrate and those along the apex often with a minor one in between, the larger leaves 8 cm. long, 2 cm. wide across the middle, oblongish to lanceolate or broadly lanceolate, with the widest portion across the middle; midvein conspicuous beneath, subolivaceous, strigulose, with 5 to 7 ascending pairs which are usually forked

toward their distal ends and terminating in the teeth, reticulations coarse and quite obscure. Inflorescence axillary, sessile, ascending, green, 5 to 8 mm. long or the pistillate ones much shorter; involucral bracts of male heads quite free, the outer ones broadly ovate, with a green setaceous tip, 5 mm. long, sparsely ciliate along the margins, finely sprinkled with cystoliths, the inner ones narrower and with hyaline margins; staminate buds upon 1 mm. long, pedicels, greenish and ciliate toward the top, the 4 or 5 segments ultimately separating clear to the base; stamens as many, deeply lobed; anthers upon inflexed filaments; bracteoles of fruiting head smaller and more ciliate; seeds brown, fusiform from the side view, 0.75 mm. long, sessile upon a 1 mm. long pedicel which is somewhat thickened and obscurely lobed distal end or perianth.

Type specimens 11751 and 11746, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September, 1909.

This pretty species forms dense masses on very moist humus covered soil, or encirling small tree trunks a few feet from the ground in a deep forested oak basin at 3750 feet, south of the Baruring river. The Bagobos call it "Rader" and "Piadar." This same species seems to extend through Negros to Luzon.

Elatostema integrifolium Wedd.

Dense thickets, 1 to 2 m. high; stem suffrutescent, with slender fibrous roots, soft, green, the thickness of an ordinary lead pencil, reclining toward the base and branched from near it, more numerously branched above the middle; branches covered with minute cystoliths, the apical portion yellowish brown strigose, widely and laxly spreading. Leaves alternatingly scattered along all the more or less numerous branchlets, nearly equally sided and straight, thinly coriaceous, dark green except the paler underside, divaricately spreading on a horizontal plane, flat or the caudate tips only slightly recurved, dull green when dry, densely covered with cystoliths on both sides, glabrous except the nerves beneath, the larger ones 1 dm. long, nearly 2 cm. wide across the middle, oblong-

ish to lanceolate, the base obliquely obtuse or subcuneate, entire except the few blunt teeth between the middle and the base of tip; midvein conspicuous and covered with olivaceous hairs beneath; the basal lateral pair parallel with the margins and connecting with the upper 3 pairs, all similarly hairy, reticulations obscure; petiole varying up to 5 mm. long, similarly pubescent along the lower side; stipules 7.5 mm. long, brown, caducous, linear lanceolate, the dorsal middle portion bearing cystoliths. Inflorescence in the leaf axils or in their scars, sessily clustered, those in anthesis 1 to 1.5 cm. across, flattened, mostly arranged on the upper side of the stem; involucral bracts broad, mainly 2-lobed, the halves with obtuse lobules, finely pubescent on the outside, greenish; inner bracteoles with truncate ciliate apices; pedicels 1.5 mm. long; perianth segments 4, of 2 decussate slightly unequal pairs, 1 mm. long, rather broad and obtuse; stamens of an equal number, the bilobed anthers inflexed in the bud state; pistillate flowers and fruits not seen.

Represented by number 10514, *Elmer*, Todaya (Mt. Apo), Mindanao, May, 1909.

In moist fertile ground of woods or in other well shaded places at 4250 feet. "Pagmag-tinang" is the vernacular Bagobo name.

There is some doubt of ours being the Indian *E. integrifolium Wedd.*

Elatostema baruringense Elm. n. sp.

Rank perennial; stems about 2 m. high, many from the same root cluster, 2 cm. thick, terete, ascending; main branches mostly above the middle, crookedly or divaricately rebranched, green, the younger ones subolivaceous pubescent, horizontally spreading or the free or ultimate ends drooping. Leaves alternatingly scattered toward the ends of the twigs, mainly descending, nearly flat or only the acuminate tips slightly recurved, submembranous, much paler green and soft dirty white pubescent beneath, the upper surface glabrous but with numerous cystoliths, the larger blades 15 cm. long, 5 cm. wide a trifle above the middle, gradually tapering toward the abruptly obtuse base, margins crenately dentate from below

the middle, inequilaterally oblique at or toward the base, drying brownish; petiole distinct but very short, pubescent; midvein quite prominent on both sides, soft hairy beneath, with 4 to 7 lateral ones; the lower pair of lateral nerves arising from near the base and parallel with the margins, the upper pair arcuate, reticulations quite apparent beneath. Inflorescence light green, axillary, usually placed somewhat along the upper side of the branchlets, grayish white in the dry state, flattened, 1 or more cm. across, sessile, staminate only; involucral bracts united below the middle, greenish, membranous, at least 4 mm. long, broadly oblong, ciliate along the margins; floral bracts linear, with green tips, densely ciliate; pedicels hyaline, at least as long as the bracts; perianth in the bud state more or less ciliate above the middle, greenish toward the 4 to 5 hyaline points; stamens 4, inflexed in the bud, the lobes nearly free, 1 mm. long; pistillate flowers and fruits not seen.

Type specimen 10916, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, June, 1909.

Forming dense patches in moist humus covered soil of dense forest at 4000 feet, along the Baruring river. The Bagobos call it "Pamag-tingan."

BOEHMERIA Jacq.

Boehmeria blumei Wedd.

Field-note:—A lax undershrub; stem suberect, tough and willow-like, terete, covered with thin smooth brown bark, 2 m. high, branched above the middle; leaves membranous, descending, much paler green or even whitish beneath, diverse in size; infrutescence green, except the brownish styles or stigmas. Quite rare in dry soil of dense woods on a nearly precipitous slope along the Sibulan river at 1250 feet. "Cagong" is the name given it by the Bagobo.

Represented by number 11198, *Elmer*, Todaya (Mt. Apo,) Mindanao, July, 1909.

Boehmeria celebica Blm.

Shrub, 5 m. high; stem somewhat curved and rather

crooked, 3 to 7 cm. thick, terete; branches mostly at the top, the lax branchlets horizontally spreading, the ultimate ones only slightly ascending, the young portion usually somewhat compressed and short strigulose; wood soft, sappy white, with a large pith; bark smoothish, brown, easily peeling. Leaves opposite, with only a few pairs at the ends of the branchlets, submembranous, flat and with the sharply acuminate tips somewhat recurved, dark green and with cystoliths on the upper glabrous side, much paler green beneath, ovately oblong or the small ones lanceolate, the larger lamina 2 dm. long by 3.5 cm. wide across the middle or just below it, subcrenately dentate except the basal entire margin, the apex gradually tapering, base rounded, the smaller blades only 3 cm. long; veins 3 from the base, the lateral pair extending two thirds the length of the blade, the 3 to 5 minor lateral pairs from above the middle, cross bars and reticulations quite conspicuous beneath, all brown and more or less strigulose beneath; petiole about 3.5 cm. long, strigulose or with cystoliths; stipule subpersistent, 1 cm. long, gradually tapering from the base to the slender point, brown membranous, the middle dorsal region covered with fine cystoliths. Pistillate inflorescence or infrutescence yellowish green, pendulous, axillary, 2 to 3 dm. long, sparingly branched from near the base; flowers forming dense glomerules, rather evenly scattered and alternatingly arranged; bracts rather few, less than 1 mm. long, broadly lanceolate to linear, puberulent along the margins and the vein on the dorsal side; ovary with the perianth obovoidly compressed, 1.5 mm. long, slenderly pointed toward the base which is usually surrounded by a circle of hairs or minute bracteoles; perianth developing into conspicuous wings, truncately rounded at the top and terminated into a short finely toothed neck, only sparsely ciliate especially so along the edges, persistent; stigmas whitish, brown when dry, 2 mm. long, usually curved, puberulent from the slighcly thickened middle portion up to the tip; fruit 2 mm. long, much compressed, the side above the middle bulged and 1.25 mm. wide; seed lenticular, darker brown, at least 0.5 mm. wide from the side view; staminate flowers not seen.

Represented by number 11306, *Elmer*, Todaya (Mt. Apo), Mindanao, August, 1909.

Collected in fertile soil of dense woods or forests in the oak flat at 4000 feet. This also the Bagobos call "Rami-rami."

There is some doubt as to the correctness in considering ours identical with the Celebese plant.

CHAMABAINIA Wight

Chamabainia cuspidata Wight

Field-note:—A creeping and slenderly branched biennial; stems filiform not numerously branched, smooth, terete, reddish; leaves membranous, richly green above, much paler green beneath, flat, horizontally disposed or arranged; inflorescence in dense axillary clusters, greenish white. Upon wet moss covered bowlders and subpendulous from cliffs along the Cati creek at 5750 feet of mount Apo. "Palauway" is the native or Bagobo name.

Represented by number 11541, *Elmer*, Todaya (Mt. Apo), Mindanao, August, 1909.

GONOSTEGIA Turcz.

Gonostegia hirta (Blm.) Miq.

Field-note:—Herbs reclining among grassy thickets of open rich flats at 3000 feet. "Sacati" is the vernacular Bagobo name.

Represented by number 11958, *Elmer*, Todaya (Mt. Apo), Mindanao, October, 1909.

Gonostegia pentandra (Roxb.) Miq.

This was mixed with number 11020 collected in warm compact soil of the cogon grass region at 1000 feet. "Cayut-coran" is the name given to it by the natives or Bagobos.

Represented by number 11020,[a] *Elmer*, Todaya (Mt. Apo) Mindanao, June, 1909.

POUZOLZIA Gaud.

Pouzolzia indica (Linn.) Gaud.

Perennial; stems few to many from the same root cluster, brown, subherbaceous, much curved or reclining at the base, suberect and greenish white above, not branched or only sparingly so, terete, 3 to 5 dm. long, extending into florescent spikes; roots a fascicle of rather hard tubers. Leaves all alternate, the uppermost becoming bract-like, the larger 3 cm. long, 12 mm. wide below the middle, ovately oblong to lanceolate, entire, base rounded, gradually coming to a sharply acute point, pulverulent on the upper conduplicate surface and with a few strigose hairs, beneath sericeous pubescent in all leaves, chiefly divaricate or the lower ones descending, soft membranous; nerves 3 from the base, prominent beneath, the basal lateral pair extending two third up the blade, a secondary lateral pair or usually with two pairs arising from the midvein a trifle below the middle, the lateral ones subparallel, reticulations none; petiole similarly hairy, 1 to 3 mm. long. Flowers and fruits in axillary clusters; stamen buds truncate at apex, nearly 1.5 mm. thick; segments 4 or 5, the tips strongly inflexed, parted to the base, coarsely hispid on the back, oblong, 2 mm. long; stamens as many and opposite the segments, inflexed in the bud; filaments glabrous, flattened ultimately as long as the segments; anthers auriculately lobed at both ends, 0.75 mm. long, a trifle wider when in full anthesis; pistillode short, erect; pistillate flower in the uppermost leaf axils subtended by a few rather broad ciliately margined involucral bracts; flowers subtended by linear bracteoles 1 mm. long, densely ciliate; perianth costate, brown 1 mm. long, hispidly ciliate, minutely dentate at the apex; stigma 2.5 mm. long, brown, finely barbate along the stigmatic side, usually curved or recurved at the tip, deciduous; fruit 1.5 mm. long, ovoidly subcompressed, 1 mm. thick below the middle, ridged, never winged, provided with the same more or less hooked spicules; seed slightly costate, ovoid, shining black when mature.

Represented by number 11020, *Elmer*, Todaya (Mt. Apo), Mindanao, June, 1909.

Collected in warm, compact and well drained soil of grass lands at 1000 feet. This plant the Bagobos call "Cayut-coran."

Apparently one of the numerous forms covered by *Hooker's* description of *P. indica* (*Linn.*) *Gaud.*

CYPHOLOPHUS Wedd.

Cypholophus moluccanus (Blm.) Miq.

Field-note:—Shrub, 3 to 5 m. high; stem round, 6 to 9 cm. thick; twigs slender, recurved and ascending, grayish green, obscurely angular; wood soft, watery, dirty white, with a large green pith, greenish gray, minutely lenticelled, easily stripping longitudinally, green beneath the epidermis; leaves horizontally spreading, flat, chartaceous, deep green above, glaucous or whitish so beneath; the dense sessile inflorescence green with the stigmas appearing somewhat whitish, the interaxillary bracts green. In rich soil of light woods mixed with cogon grass at 3000 feet. The native or Bagobo name is "Salabugan."

Represented by number 10865, *Elmer*, Todaya (Mt. Apo), Mindanao, June, 1909.

Cypholophus microphyllus Elm. n. sp.

A low, sprawling and suffrutescent shrub; stem 1 m. long or high, terete, freely branched above the middle, greenish brown, solitary or few from the same root cluster; branches freely rebranched, spreading, tough, the ultimate ones suberect and dirty brown pubescent. Leaves quite rigid with serrate denticulate margins except toward the base, ascending or horizontal, easily breaking, deep green and sublucid on the upper finely papillate glabrous side, much paler green beneath and also glabrous except the veins, drying brown especially the lower side, rugose, unequal in size and shape, the larger blades 3 cm. long by 2 cm. wide above the middle and obovate, the smaller ones articulate and 1 cm. across, the apex broadly rounded or with short abruptly pointed apices, base rounded and obtuse in the smaller ones, subcuneate in the larger leaves, copious, opposite, evenly scattered along the branchlets; midvein quite prominent beneath and strigose with a basal much ascending lateral pair and 1 or

2 minor lateral pairs above the middle, reticulations quite conspicuous beneath, all similarly, strigose; petiole always less than 1 cm. long, densely appressed hairy; stipule 5 mm. long, ovately lanceolate or linear, membranous, brown, glabrous except the few scattering hairs on the dorsal middle region, subpersistent. Flowers and fruits in axillary sessile clusters, 3 to 5 mm. across, subtended by brown, glabrous, linear, delicate bracts, flattened, glabrous 0.76 mm. long, nearly straight along the ventral edge, bearing a subpersistent puberulent stigma, strongly recurved above the middle toward the more or less bulged dorsal edge; the perianth enclosing the seed and the basal portion of the stigma; mature achenes obovoidly lenticular from the side view, more or less compressed, straw color, 1.35 mm. long; staminate flowers not seen.

Type specimen 11588, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, August, 1909.

Discovered on seepage ledges along the Cati creek at 6000 feet, on the eastern slope of mount Apo. This handsome high alpine species the Bagobos know as "Rami-rami."

Cypholophus brunneolus Elm. n. sp.

A laxly branched suberect shrub, 3 m. high; stem 3 cm. thick, terete, soft, solitary or a few from the same root cluster, branched above the middle; bark smooth, easily stripping, greenish on the branchlets, brownish on the stem, dirty strigose on the young twigs; wood sappy white, with a large green pith. Leaves coriaceous, ascendingly recurved, rugose, the upper dark green side glabrous and flat, beneath more or less finely strigose and much lighter green, easily breaking, opposite, well scattered along the branchlets, finely dentate except the entire basal margins, the average blades 8 cm. long, 3.5 cm. wide across the middle or a trifle above it, elliptically oblong, apex acute, base obtuse or rounded, turning brown while drying; veins 3 from the base, the lateral pair nearly extending to the apex, the midvein with about 5 minor lateral pairs from above its middle, reticulations quite prominent beneath, all beset with whitish strigulose hairs; petiole 1 to 2 cm. long, similarly strigose; stipules 7.5 to 10 mm. long, brown, with only a few hairs along

the median dorsal line, oblongish lanceolate, terminating into a slender point, deciduous. Flowers and fruits in dense glomerules less than 1 cm. across, usually encircling the branchlets at the fallen leaf axils; involucral bracts irregular, glabrous, brown, rather thin, 1.5 mm. long; floral bracts numerous, hyaline, narrower and slightly shorter, also glabrous; pedicel of staminate flowers nearly 2 mm. long, without hairs; perianth similar in vestiture, campanulate, a trifle shorter, lobed to the middle; segments 4, ovately triangular, the apical margins with a few fine hairs; stamens as many, opposite the segments; filaments 1.5 mm. long, glabrous, conspicuously flattened below the middle; anthers broadly elliptic, 0.75 mm. long, emarginate at both ends, basifixed; pistillate flowers upon short branched stalks densely bracteate; achenes obovoidly lenticulate, 0.5 mm. long, closely surrounded by the perigonia which terminate about the base of the stigmas into minute teeth, subglabrous or with only a few strigulose hairs at the neck; stigma persistent, strongly recurved above the middle, finely puberulent except the basal portion.

Type specimen 11641, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September, 1909. Also my number 11587.

In very rich humid soil of dense woods at 4000 feet.

The last cited number is not exactly as the type, and was associated with *C. microphyllus Elm.* at 6000 feet along the Cati creek. The former the Bagobos call "Salabogan," the latter "Rami-rami."

PIPTURUS Wedd.

Pipturus succulentus Elm. n. sp.

Scandent; stem terete, 5 cm. thick, numerously branched; twigs slender, lax, brown, curved and drooping, with suberect tips; wood soft, porous, watery, odorless and tasteless; bark brown, smoothish except the puberulent tips. Leaves dull brown in the dry state, alternatingly scattered along the branchlets, the upper side deep green and glabrous, paler beneath and with a very fine puberulence, linearly oblong to lanceolate, quite variable in size, flat except the recurved acute to acuminate tips, the longer blades 1 dm. in length, 2.5 cm. wide across the

middle, base abruptly obtuse or subrotund, the entire margins finely ciliate in the young state; veins 3 from the base, parallel, the 2 basal lateral pairs extending nearly to the apex, the midvein with a pair of small lateral ones toward the top, all brown and finely pubescent in the young state, becoming glabrous, the cross reticulations faint; petiole 1 to 2 dm. long, terete, appressed pubescent; bud bracts 3 mm. long, brown, deciduous, rather broad at the base and with a setulose point, puberulous along the margins and about the base. Inflorescence pistillate, mostly ascending, averaging 7.5 mm. long, usually solitary from the leaf axil; the rachis pale green and very finely grayish puberulent, occasionally bearing a foliaceous bract, glomerules rather evenly scattered and alternatingly arranged; the few subtending bracts finely ciliate along the margins, ovately triangular and terminating into slender points; the floral bracts 0.5 mm. long, their margins and basal portion densely covered with whitish hairs; achene sessile, dark green, 1 to 1.25 mm. long, flattish, ellipsoid, subglabrous except the finely ciliate or fimbriate apex; stigma articulate at the apex of the achene, creamy white, drying brown, curved or twisted, 3 mm. long, spiculose except the very basal smooth portion; perianth apparently closely adnate to the seed; staminate flowers not seen.

Type specimen 10739, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, May, 1909.

Scandent upon small trees or sprawling over thickets along the Baruring river at 3500 feet. The profuse well interlaced branches bear quite heavy and succulent leaves and flowers. "Ramee" is the Bagobo name.

The young infrutescence is on the exact plan of that of *P. repandus Wedd.*, but otherwise it is a very different species.

Pipturus mindanaensis Elm. n. sp.

A rather densely branched and suberect shrub, 1 to 2 m. high; twigs slender, fastigiate, ascending, the young portion covered with a short and soft pubescence; wood soft, greenish white, with a large green pith, odorless and tasteless; bark smooth, brown, easily peeling. Leaves alternate, rugose especially beneath, mostly toward the ends of

the fine branchlets, diverse in size, copious, membranous, flat, the roughened sparsely strigulose upper surface light green, beneath much paler and soft tomentose, most of them descending, ovately oblong to broadly lanceolate, the larger blades 8 cm. long by 2.5 cm. wide across the middle or just a trifle below it, apex gradually tapering into the acute or acuminate point which is usually falcate, base obtusely rounded, serrately dentate except the entire basal portion, the lower side turning olivaceous brown and the upper nearly black when dry; midvein quite prominent beneath, densely subolivaceous pubescent, with 3 to 5 lateral pairs; the basal pair strict and extending two thirds up the blade, the other ones ascendingly arched, reticulations fine and quite conspicuous, all similarly hairy petiole 0.75 to 1.5 cm. long, pubescent; stipule free, 7.5 mm. long, the sides hyaline and brown, deciduous, only the medium dorsal line and the basal portion strigulose, lanceolate, with a sharp point. Pistillate flowers and fruits mainly clustered in the fallen leaf axils along the branchlets; flowers upon pseudostalks, solitary or 2 to 3-clustered; the basal subtending bracts quite broad, less than 1 mm. in length, finely ciliate along the margin and on the exposed dorsal side especially along the median line; the inner ones smaller, narrower, less ciliate; perianth 0.5 mm. long minutely 3-toothed, subglabrous or very finely ciliate especially toward the top; stigma puberulent, 1 mm. long, longer in the fruit, recurved at the tip, articulate at the base and sublaterally attached, pale white in the fresh state, dark brown when dry; fruit 1.5 mm. long, obliquely obovoid, 1 mm. thick above the middle, pointed toward the base; the pubescent perianth easily separating from the slightly compressed achene.

Type specimen 10520, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, May, 1909.

A laxly branched erect shrub on a steep open slope of fertile soil on Angat's knoll at 3750 feet. "Ami rami" is the vernacular Bagobo name.

Quite distinct from *P. aspera Wedd.*

Pipturus (n. sp. in ms. by *C. B. Robinson.*)

Field-note:—Climbing small trees or sprawling; stem 5 cm. thick, terete, numerously branched all along; twigs numerous,

forming a tangled mass, slender, somewhat drooping and with ascending tips; wood flexible, porous, whitish, odorless, distinctly sweet; bark relatively very thick, smooth, grayish mottled on the stem, brown on the branches; leaves heavy, descending, slightly recurved and conduplicate on the upper deep green and lucid surface, whitish, beneath, coriaceous but easily breaking; inflorescence ascending, pistillate, green except the whitish stigmas which upon drying turn olivaceous brown. Collected in wet rocky soil of thickets filled with river debris below the Sibulan falls at 2500 feet. Rare! "Rame-rame" is the Bagobo name.

Represented by number 11776, *Elmer*, Todaya (Mt. Apo), Mindanao, September, 1909.

LEUCOSYKE Zoll. et Mor.

Leucosyke capitellata villosa Wedd.

Field-note:—Shrub 2.5 to 4 m. high; stems ascending, usually several from the same clump; wood soft, whitish, odorless and tasteless; bark smooth, gray and brown mottled, readily peeling; leaves usually descending, curvingly conduplicate upon the upper dull green surface, whitish beneath, submembranous easily wilting; fruiting heads globose, less than 1.25 cm. in diameter, usually subpendulous upon the recurved stalks, dark green. Upon densely thicketed flanks along the Sibulan river at 3000 feet.

Represented by number 10656, *Elmer*, Todaya (Mt. Apo), Mindanao, May, 1909.

MAOUTIA Wedd.

Maoutia setosa (M. platystigma) Wedd.

Field-note:—Lax shrub, 4 m. high; stem branched from the middle, the ascending branchlets lax; wood sappy white, very soft, odorless and tasteless, with a large pith; bark brown, minutely checked longitudinally; blades horizontal or descending, flat or only a trifle recurved toward the apex, submembranous, deep green above, nearly chalky white beneath,

greatly varying in size. Inflorescence soft and quite fragile, pale green. Collected in wet earth along the Sibulan river below its falls at 2500 feet. The Bagobo vernacular name is "Alayan."

Represented by number 11777, *Elmer*, Todaya (Mt. Apo), Mindanao, September, 1909.

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LEAFLETS OF PHILIPPINE BOTANY

EDITED BY A. D. E. ELMER, A. M.

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EUPHORBIACEAE COLLECTED ON SIBUYAN ISLAND

BY

A. D. E. Elmer

—o—

ACTEPHILA Blm.

Actephila gitingensis Elm. n. sp.

A strict undershrub; stem terete, 2.5 cm. thick, quite rigid; branches divaricately spreading, chiefly toward the top, rebranched; wood yellowish white, odorless and tasteless, moderately soft; bark brown and gray mottled, thin, smooth. Leaves at the ends of the twigs and more or less crowded, alternate, coriaceous, glabrous, drying green, horizontally spreading, shining deep green above, much paler or yellowish so beneath, oblong, entire, tips acute to acuminate, recurved, base bluntly cuneate or abruptly obtuse, the larger blades 1.5 dm. long, 4 cm. wide across the middle or a trifle above this; petiole smooth, 3 cm. long, brown at both ends; stipular bracts very short, thick, grayish puberulent; midvein brown, prominent beneath; lateral ones 7 to 9 or even 11 on a side, divaricate, relatively faint, their ends arched and united, reticulations obscure. Flowers and fruits either axillary or lateral; staminate flowers with 1.5 mm. long pedicels arising from short bracteate tubercles; sepals whitish and with pink-

ish borders, 5, united at the base, 5 mm. long, oblong, rounded at apex, hairy on the back; petals also 5, alternating with the outer series of the perianth, less than one half as long, hyaline, truncately winged at the apex, the basal portion clawed; ovary disk with a thick whitish crenately lobed margin; stamens 5 or 6, suberect; filaments whitish, 1 mm. long, free, glabrous; anthers basifixed, 0.33 mm. high, 0.5 mm. wide, laterally dehiscing; style erect, 1 mm. long, falsely united into 3 parts; pistillate flowers upon 1 cm. long glabrous pedicels which are more or less thickened toward the apex; calyx more delicate and less pubescent; petals notched, the apical lobes fimbriate; stamens entirely lacking; ovary glabrous, ovoid, 1.5 mm. long, terminated by 3 short doubly divided processes bearing whitish capitate stigmas, 3-celled; fruits with 6 seeds, pendulous upon slender stalks, the base somewhat sunken and with the perianth segments persistent, similarly flattened at both ends, greenish white, 2.5 cm. wide, 1.5 cm. high, dehiscing along both sutures.

Type specimen 12141, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

This handsome tree-like undershrub was commonly seen in woods of stony or gravelly soil along the Pauala river from 750 to 1250 feet altitude.

Actephila magnifolia Elm. n. sp.

Low, erect, normally unbranched shrub; stem more or less crooked, 5 dm. to 1 m. in height, 2 cm. thick, terete, quite rigid; wood odorless and tasteless, greenish white, rather tough; bark dull brown, smooth or only sparingly lenticelled. Leaves few at the top, horizontally spreading, coriaceous, flat, a trifle paler green beneath, glabrous, entire, drying green, diverse in size, sharply acute to acuminate, base obtuse or subrounded, the larger blades 3.5 dm. long, 1.5 dm. wide across the middle, oblong, alternate or subopposite; midvein prominently raised beneath, scurfy toward the base, brown in the dry state; lateral nerves 9 to 11 on each side, ascendingly arched, united with coarse reticulations, smooth and brown in the dry state; petiole 3 to 7 cm. long, scurfy

brown, terete, the slightly thickened ends 5 mm. thick; stipular bracts smooth, quite thick and persistent, obtuse or subacute, 3 mm. long, nearly as wide across the base. Flowers and fruits terminal, axillary or even lateral, the former greenish yellow except the light yellow anthers and purplish tinged perianth segments; pedicel smooth, terete and rather thick, 1.5 mm. long; sepals 5, united at the base, nearly 3 mm. long, ovately oblong, finely ciliate about the obtusely rounded apex, 3-striate; petals ligulate, 0.75 mm. shorter than the sepals, truncate at the apex; ovary disk flat, thick, whitish, crenately lobed on the outside, glabrous; style erect, short, 3-parted; stamens 5; filaments glabrous, whitish, erect or ascending, exceeding 1 mm., free; anther 0.25 mm. high, 0.5 mm. wide, basifixed, laterally dehiscent; fruit upon 1.5 cm. long stalk, subtended by the perianth segments, similarly flattened at both ends, smooth, hard, yellowish green, at least 1.5 cm. wide, 3-celled, each cell with 2 seeds, dehiscing along both sutures.

Type specimen 12303, *A. D. E. Elmer*, Magallanes (Mt. Giting giting), Province of Capiz, Island of Sibuyan, April, 1910.

Found to be quite common in only one place in compact humus covered fertile soil of a damp forested incline at 1000 feet. Named by the Visayan "Tooman."

Its affinities are with the Celebese *A. gigantifolia Koord.*

ANTIDESMA Linn.

Antidesma cumingii Muell. Arg. in *DC.* Prod. XV^{2}; 248, 1862.

Field-note:—Shrub 3 to 4 m. high, in compact reddish soil of shrubberies or in light woods at 750 feet.

Represented by number 12459, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, May, 1910.

It is not the same as *A. membranifolium Elm.* from Lucban.

Antidesma lucidum Merr. in Philip. Journ. Sci. Suppl. I; 78, 1906.

Field-note:—A slender erect shrub; stem terete, 2.5

cm. thick, 3 and 4 m. high, more or less crooked; branches crookedly rebranched, mostly at the top; wood reddish white, rather hard, odorless and tasteless; bark smooth, brown; leaves rigidly coriaceous, ascendingly recurved, otherwise flat, lucid deep green above, much paler green beneath; inflorescence pistillate only, ascending from the leaf axils, the odorless flowers yellowish. Scattered among other undershrubs on a wooded wind swept ridge at 4750 feet or higher, in moist red soil with some rocks.

Represented by number 12519, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, May, 1910.

Antidesma leptocladum genuinum Muell. Arg. in *DC.* Prod. XV^2; 253, 1862.

Field-note:—Shrub 3 m. high; stem terete, 5 cm. thick, branched above the middle, widely spreading, the ultimate ones lax; wood quite solid, the sapwood whitish, brownish toward the center; bark smooth, yellowish gray; leaves coriaceous, horizontal, nearly flat, shining deep green above, paler green beneath; inflorescence terminal, axillary, sparingly branched, the rachis succulent and deep green, the calyx yellowish so; filaments whitish; flowers odorless. In moist gravelly soil along wooded banks of the Sinuban creek at 750 feet. The natives call it "Tuba."

Represented by number 12191, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, April, 1910.

BREYNIA Forst.

Breynia rhamnoides Muell. Arg. in *DC.* Prod XV^2; 440, 1866.

Field-note:—Shrubs; stem 5 m. high, 12 cm. thick, suberect, terete; its main branches from the middle, freely rebranched and widely spreading, the ultimate ones green; wood dingy white, rather soft, slightly fetid, tasteless; bark brown or yellowish, coarsely checked; leaves very smooth, submembranous, nearly flat and horizontally spreading, dull green above, glaucescent beneath; flowers pale green or yellowish, subpendulous; fruits bright red, globose or nearly

so, suberect. Common in thickets and light woods bordering meadows along the coast. "Torog-torog" is the native Visayan name given to it.

Represented by number 12445, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, May, 1910.

CLAOXYLON A. Juss.

Claoxylon subviride Elm. n. sp.

An erect slender tree-like shrub; stem 7.5 cm. thick, 5 m. high, terete, more or less crooked; main branches few, arising from below the middle, crookedly rebranched, spreading, not very numerous, the ultimate ones slender and suberect at the tips; wood dingy white, odorless, with a sweetish taste, soft; bark smooth, yellowish mottled, green beneath the epidermis. Leaves subcoriaceous, horizontally spreading, nearly flat, slightly paler green beneath, glabrous, drying green, harsh on both sides, margins minutely dentate, serrate, subentire toward the base, apex acuminately caudate, base cuneate or obtuse, blade 2.5 dm. long, 7.5 cm. wide across the middle, oblong or the smaller ones oblong to lanceolate, alternate, at the ends of the young twigs only; petioles 2 to 8 cm. long, the average ones 5 cm. long, green, puberulent or faintly pubescent; stipules mere vestiges; midvein prominent beneath, with 5 to 7 lateral pairs, the basal 2 to 3 pairs straight, the upper ones arcuate, the cross bars and coarse reticulations rather conspicuous; staminate inflorescence solitary and axillary, pale green, ascending, 6 to 10 cm. long, the rachis olivaceous pubescent; flowers whitish except the greenish perianth, falling exceedingly early; the subtending bracts ovately acute, similar in color and pubescence, 2 mm. long; pedicel 3 mm. long, hairy; sepals 3, nearly free, oblong to elliptic, 3.5 mm. long, short acute or obtuse, pubescent; stamens at least 50, crowded upon the receptacle, creamy white; filaments glabrous, 1.5 mm. long, intermixed at the base with hyaline setosely fimbriated scales 1 mm. long; anther 0.75 mm. long, attached at the connate base, quite free otherwise; pistillate flowers and fruits not seen.

Type specimen 12374, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

Only once seen in red humus covered soil mixed with shale rocks on a humid forested slope at 1750 feet along the trail leading down toward España.

Its affinities lie with *C. rubescens Miq.* and the two varieties under it from the Philippines, but our specimens have twice the number of stamens, blades differently shaped, without reddish veins and petioles much longer.

CLEISTANTHUS Hook.

Cleistanthus integer C. B. Rob. in Philip. Journ. Sci. III; 196, 1908.

Field-note:—Slender suberect tree; stem 1 dm. thick, subterete, 7 m. high; its main branches arising from below the middle, finely and laxly rebranched; wood without odor or taste, quite hard, reddish toward the center; bark yellowish gray, peeling in small shredded plates; leaves descending, nearly flat, thinly coriaceous, much paler green beneath; flowers ascending, creamy white, odorless, the subglobose fruits yellowish green, also ascending, 3-celled, bearing the persistent brownish black forked stigma. In gravelly or stony soil of wet wooded banks along the Dulangan creek at 1250 feet. Quite rare!

Represented by number 12244, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, April, 1910.

Cleistanthus (n. sp. in ms. by *C. B. Robinson.*)

Field-note:—A small shrub-like tree, 5 m. high, 1 dm. thick, erect; branches copious, arising from below the middle, divaricate, slenderly rebranched, the ultimate ones lax, all more or less horizontally spreading; wood quite heavy and hard, whitish except the reddish central portion, odorless and tasteless; bark smooth, gray and brown mottled; leaves horizontal or descending, submembranous, flat with recurved tips, light green above, variable in size, whitish or glauces-

cent beneath; infrutescence suberect, along the branchlets mostly, solitary or occasionally 2 or even 3-clustered, upon very short stalks; fruits subglobosely trilobed, hard, green, 2.5 cm. across, 3-celled and 3-sedeed. In wet alluvial soil along streamlets of light woods at 750 feet. The local Visayan name is "Cacao."

Represented by 12381, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, April, 1910.

Cleistanthus robinsonii Elm. n. sp.

Slender and tall trees; trunk 6 dm. thick, 12 to 15 m. high, burly or wadded toward the base; branches from the middle, spreading, numerously rebranched, the ultimate ones lax and horizontally spreading; wood dingy white on the outside at least, hard, burly, without odor or taste; bark relatively thin, brown, scaling in plates, reddish beneath the epidermis. Leaves drying green, submembranous, shallowly folded upon the upper pleasing green glabrous surface, glaucescently green and sparsely puberulent beneath, margins entire and curved upon the lower side in the dry state, alternatingly scattered along the thin short brown pubescent twigs, linearly oblong, the average blades 7.5 cm. long, 2 cm. wide across the middle, apex slenderly acuminate, base obtuse; midvein prominent, more or less short brown pubescent; the 8 to 10 lateral pairs ascending, curved especially toward the tips which are faintly united, much less hairy, with axillary glands, reticulations evident from both sides; petioles 5 mm. long at least, dark brown pubescent. Flowers fascicled in the leaf axils, sessile, arising from short tubercles clothed with densely pubescent minute bracts; calyx glabrous, yellowish green, 4 mm. long, the basal 1 mm. united; its segments 5, oblong, acute, 4 mm. long, curvingly reflexed; petals thinner, also 5 and alternating with the calyx segments, obovate, nearly 1 mm. long; disk irregularly lobulate, whitish; filaments of the same color, glabrous, 3 mm. long, the basal portion united, the upper 2 mm. free and gradually tapering to a fine point; anther yellowish at the apex, base bilobed, attached to the middle of the back; style thick, 1.5 mm. long; fruits not seen.

Type specimen 12540, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910.

Discovered this *Cleistanthus* tree on wooded declivities near cascades of the Sinuban creek at 1000 feet. It was observed in one or two other similar places. Named after *C. B. Robinson*, economic botanist, Bureau of Science.

Cleistanthus pseudocanescens Elm. n. sp.

Tree; stem 15 cm. thick, 7 or more m. high, the main branches arising from the middle; branchlets numerous, lax and slender; wood moderately soft, reddish toward the center, odorless and tasteless; bark brown, smooth or lenticelled. Leaves chartaceous, horizontal or descending, nearly flat except the slightly recurved acute to acuminate apex, alternatingly scattered, the entire margins rugose and subinvolute in the dry state, base obtuse or in the larger leaves rounded, shining dark green on the glabrous upper side, dull ashy green, the larger blades 15 cm. long, 5 cm. wide across the middle, frequently much smaller, oblong to subelliptic; midvein prominently raised beneath, very finely covered with grayish brown hairs; the 9 to 11 lateral pairs arcuate, also conspicuous beneath, similarly pubescent, reticulations equally evident from both sides; petiole 1 to 1.5 cm. long, stout, more or less covered with yellowish brown hairs, in the dry state rugose and with age becoming glabrous. Flowers ascending, fascicled in the leaf axils, arising from short tubercles clothed with small brown pubescent bracts; pedicels 1.5 mm. long, glabrous, gradually extended into the calyx; segments 1.75 mm. long, acute, curvingly reflexed, yellowish green, also glabrous; petals as many and alternating with the calyx segments, delicate, obcuneate, 0.75 mm. long, dentate or obscurely fimbriate along the upper margin; disk rather thick, similarly fringed; stamens 4 or 5, united into a glabrous column narrowed toward the base; the free portion of the glabrous filament whitish, succulent, tapering from the base to a fine point, strict, ascending, 1 mm. long; anthers yellow, elliptic, nearly 1 mm. long, bilobed at the base, attached to the middle portion of the back; style as long,

relatively thick, apparently becoming 3-lobed at the apex; fruits not seen.

Type specimen 12140, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, March, 1910.

Collected in damp fertile soil along wooded streams at 500 feet. The local Visayan name is "Pinay."

C. myrianthus King, but our specimens have larger flowers, and leaves which are relatively broader and fewer-nerved.

Cleistanthus isabellinus Elm. n. sp.

A medium-sized tree; stem 2.5 dm. thick, 8 m. high at least, branched from the middle; main branches spreading, ultimately laxly rebranched, with the thin twigs horizontal or drooping; twigs gray and brown lenticelled or the younger portion yellowish brown; wood moderately hard and heavy, burly, odorless and tasteless, reddish brown except the relatively thin whitish sapwood; bark dull brown, reddish so beneath the epidermis. Leaves copious, descending, coriaceous or subchartaceous, folded upon the upper shining deep green surface, glaucous or yellowish brown beneath, drying similar in color, alternate, entire, the lower surface of the younger ones with a very fine isabellinus colored indument, the larger blades 1 dm. long, 4 cm. wide across the middle, acuminate to caudate at apex, base obtuse to acute, subelliptic or oblong elliptic; petiole 1 cm. long, brown puberulent, ultimately glabrous; midvein prominently raised beneath, becoming glabrous, the 6 to 9 ascendingly curved lateral pairs faint and with tips articulately united, reticulations scarcely evident. Flowers not seen; fruits solitary or 3-clustered, axillary, erect, 3-celled and 3-seeded, mostly along the branchlets, 1.25 cm. thick, truncately flattened at both ends, smooth, turning reddish brown, 3-lobed especially the apical portion; pedicel glabrous, nearly 3 mm. long, relatively thick, subtended by 5 triangularly acute perianth segments, arising from flattened tubercles clothed with short finely pubescent bracts.

Type specimen 12268, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

Rare in damp gravelly soil of a wooded bank along the Patoo river at 750 feet.

CROTON Linn.

Croton leiophyllus Muell. Arg. in Linnaea XXXIV; 1865-66: also in *DC.* Prod. XV^2; 573, 1862.

Field-note for 12070:—Slender tree, 8 m. high, with a 1 dm. thick stem; branches few, toward the top only, crookedly rebranched, the lax twigs gray; wood rather hard, heavy, dingy white, odorless and tasteless; bark smooth, mottled; petioles thickened at both ends; blades only shallowly folded upon the upper dark lucid green surface, much paler green beneath, coriaceous; inflorescence terminal, from 1 to 3-spicate, ascendingly recurved, greenish except the more yellowish stamens; flowers odorless, the lower ones mainly pistillate, the upper ones staminate; style flattened, divergent, green, bearing forked brown colored stigmas; ovary 3-celled. Collected in red clay at 2000 feet on the ridge near the trail to España.

Represented by numbers 12070 and 12084, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, April and May, 1910.

Number 12084 is a less typical and stocky tree, rather common in the valley about Magallanes. Its old leaves turn to yellow and orange red at the time of shedding. Number 12070 is typical of *Cuming's* 998.

CYCLOSTEMON Blm.

Cyclostemon gitingensis Elm. n. sp.

A slender shrub-like tree; stem 3.5 cm. thick, 5 m. high; branches mostly from above the middle, rebranched, relatively short, spreading; wood whitish, odorless, quite hard; bark smooth, greenish gray mottled; the twigs bearing whitish lenticels. Leaves alternatingly scattered, glabrous, ascending or horizontal, flat or only the acute or acuminate tips slightly recurved, coriaceous, paler green beneath, curing green, base acute to obtuse, the entire mar-

gins brown and slightly involute, oblong to broadly lanceolate, 12.5 cm. long, 4 cm. wide across the middle or a trifle below it; petiole glabrous, 1 cm. long; midvein very prominent beneath, the 5 to 8 lateral pairs inconspicuous but equally evident from the upper side, their tips united a few mm. below the margins; reticulations nearly as evident, equally plain on both sides; stipules united or obsolete. Flowers not seen; fruits usually solitary, axillary or lateral, upon deep green subglabrous 3 mm. long pedicels, ovoidly globose, 1 cm. long, creamy white, finely scurfy gray on the outside, subtended by a circular rim-like disk bearing at the apex 2 subsessile brown divergent stigmas, usually with a single stony seed.

Type specimen 12317, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

Discovered in wet gravelly or stony soil of densely wooded banks along the Sinuban creek at 1000 feet. The natives call it "Lacong" in the Visayan dialect.

Allied to *C. monospermus Merr.* but our leaves are acute to acuminate, never obtuse or rounded, larger and more conspicuously veined.

Cyclostemon merrittii Elm. n. sp.

Small erect tree; stem 1 dm. thick, 5 m. high; branches from below the middle, divaricate, rebranched, forming an elongated crown; wood heavy, sappy white, without odor or taste, moderately soft; bark smooth, grayish green, deep green beneath the epidermis. Leaves ample, horizontal or usually descending, chartaceous, glabrous, alternatingly scattered, dull green on the upper shallowly folded surface, much paler beneath, drying dull brown, oblong to elliptic, varying in size, the entire margin slightly involute in the dry state, the larger blades 2 dm. long, 7 cm. wide across the middle, apex with a short abrupt acute point, the basal sides subrotund and very inequilateral, the upper side extending 1 cm. further down; midvein prominently raised beneath, the 9 to 11 lateral ones arcuate and also quite conspicuous; reticulations fine, very evident especially on the lower side; petiole stout, glabrous, 1.5 cm. long, scurfy

grayish brown along the lower side; bud bracts acuminate, less than 5 mm. long, with short yellowish brown appressed hairs. Flowers not seen; young fruits 1 to 3-clustered, usually along the branchlets, upon 1.25 cm. long green and pubescent pedicels which are more or less subtented at the base by small dry bracts; calyx canescent, saucer-shaped, rather thick, subentire; ovary or young fruits densely canescent, otherwise green, 2-celled, several ovuled or seeded, subglobose, 5 mm. thick, bearing at the apex 2 brownish black, sessile, irregular plates; stigmas upon a large, glabrous and rim-like disk which is adnate to the calyx.

Type specimen 12247, *A. D. E. Elmer*, Magallanes (Mt. Giting giting), Province of Capiz, Island of Sibuyan, April, 1910.

Collected it in red stony soil of light woods or thickets near a streamlet at 750 feet. Called by the native Visayan "Talon-manok."

Its relation is with *C. bordenii Merr.*, but there are numerous differences. Staminate specimen were collected on Mindoro by *M. L. Merritt*, Forestry Bureau numbers 4067 and 4068.

Cyclostemon sibuyanensis Elm. n. sp.

A medium-sized tree; trunk 5 dm. thick, 12 m. high; main branches arising from above the middle, crookedly rebranched, rather short, the ultimate ones slender; wood pale white, moderately hard, odorless and tasteless, finely grained; bark smoothish, dull gray and somewhat mottled. Leaves alternatingly scattered along the twigs, mostly horizontal, conduplicate on the upper very deep green shining surface, the abruptly acuminate points strongly recurved, base obtuse or acute, glabrous, drying greenish brown, entire margins thickened beneath the edge, oblong to elliptic, 12.5 cm. long, 6 cm. wide across the middle, thinly coriaceous or subchartaceous; stout petioles glabrous, 1 cm. long, in the younger ones occasionally glaucous; midvein prominent, the 7 to 9 lateral pairs less prominent and arcuate, reticulations relatively conspicuous especially on the lower side, all smooth and shining. Flowers not observed; young fruits vel-

vety dark green, globose, 1.5 cm. thick, globose, few in either the leaf axils or lateral, upon very short pedicels; calyx segments breaking off from the persistent calyx base; the segments rather thick, ovately rounded and 5 mm. long; stigmas subpersistent, brown, sessile, 3-parted; cells 3, with 1 to 3 ovules or young seeds in each.

Type specimen 12275, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

Found in reddish sticky soil at 750 feet in humid forests along the Patoo river. The local Visayan call it "Bagbog."

Somewhat resembling *C. littoralis Roxb.*, but distinct.

ELATERIOSPERMUM Blm.

Elateriospermum paucinervia Elm. Leaf. Philip. Bot. II; 484, 1908.

Field-note:—A medium-sized tree; stem 6 dm. thick, 14 m. high; its main branches toward the top, spreading, crookedly rebranched, the twigs usually green; wood odorless and tasteless, yellowish white toward the center, moderately hard and fine for cutting; bark smoothish, rather mottled; petioles ascending, terete, green, thickened at both ends; blades folded upon the upper side, coriaceous, deep green and sublucid above, much paler or even yellowish green beneath, margins wavy, tips twisted and recurved, fruits subglobose, solitary or few-clustered, terminal, upon stout short stalks, 3 to 5 cm. across, 2 to 3-celled, with an equal number of flattened seeds, hard and deep green. Collected on a steep, forested ravine in a moist shale rocky soil at 1750 feet on the trail toward España.

Represented by number 12367, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, April, 1910.

So far the few known Philippine specimens are in fruit only, and consequently its generic rank is still in doubt.

EVERETTIODENDRON Merr.

Everettiodendron philippinense Merr. in Philip. Journ. Sci. IV; 279, 1909.

Field-note:—Slender tree; stem subterete, 7.5 cm. thick, 7 m. high or much larger; branches mostly at the top, widely spreading, rebranched, the twigs suberect; wood odorless and tasteless, soft or rather hard, the sapwood white, red in the center, with fine radial lines; bark brown, more or less shedding in small plates, on the branches smooth; leaves horizontal or descending, coriaceous, flat or slightly folded, tips recurved, deep dull green above, much lighter green beneath, petioles brownish; fruits solitary from the uppermost leaf axils, subpendulous, dull reddish brown, subglobose, 2.5 cm. across, with a conspicuous apex, 3-celled, the thick exocarps falling off thereby leaving the seeds in tact to the persistent placentae, upon 2.5 cm. long pedicels. In humus covered sticky red soil of a forested bench or ridge at 1250 feet.

Represented by number 12204, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, April, 1910.

EXCOECARIA Linn.

Excoecaria philippinensis Merr. in Philip. Journ. Sci. Suppl. I; 82, 1906.

Field-note:—Small tree; stem 1 dm. thick, 5 m. high; main branches from the middle, laxly rebranched and widely spreading, the ultimate ones green and suberect; wood quite soft, white and tinged with red especially toward the center, odorless and tasteless; bark thin and yellowish brown, scaling in thin plates, with an abundance of viscid latex; leaves horizontal or ascending, nearly flat, dull green above, much paler or yellowish so beneath; inflorescent spikes erect, solitary or few, terminal, the rachis yellowish red, the flowers light yellow. Collected in red soil among rocks of a forested ridge at 2750 feet. "Limbahon" is the local Visayan name.

Represented by number 12432, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, May, 1910.

The type is *P. T. Barnes* number 138 from mount Mariveles, and its anthers are distinctly stalked in the flowering state.

GELONIUM Roxb.

Gelonium glandulosum Elm. n. sp.

An erect shrub-like tree; stem 8 cm. thick, 3 to 4 m. high; its main branches from below the middle, laxly and slenderly rebranched; wood moderately soft, whitish, odorless and tasteless; bark mottled, peeling in plates on the stem, smooth on the branches. Leaves horizontal or descending, glabrous except the nerves beneath, alternatingly scattered toward the ends of the subglabrous and green twigs, subchartaceous, a trifle paler green beneath, retaining its color in the dry state, obtuse to acute at the apex, base broadly obtuse, entire or with united apiculations, elliptic, the larger blades 1 dm. long, one half as wide across the middle; petiole at most 1 cm. long, frequently only one half as long, green, glabrous; bud bracts green, slenderly acuminate, 7.5 mm. long, finely puberulent; midvein prominent, hairy along the sides or becoming glabrous, with 6 to 9 arcuate lateral pairs which in their axils harbor small tufts of dirty brown hairs, all yellowish green, reticulations very fine and obscure. Flowers upon short greenish brown usually unbranched tubercles; perianth of the same color, composed of 10 segments, imbricate, the outer 5 finely ciliate along the margins, united below the middle, rounded, the inner 5 with smooth margins and quite a little longer, the longer ones nearly 5 mm. in length; stamens 5, inserted upon a fleshy brown colored disk-like rim 0.5 mm. high; filaments glabrous, at least 0.5 mm. long, pale white; anthers basifixed although the filaments extend clear through and expand as an obscure hyaline projection, 1 mm. long, subtruncate at the base, dehiscing along the lateral side from the apex toward the base, yellowish; ovary woolly; style glabrous, 1 mm. long, terete; young fruits obovoidly globose, 3-seeded.

Type specimen 12315, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

Collected it in gravelly soil of wooded banks along the Sinuban creek at 750 feet. Commonly observed but the specimens were gathered at least a month too early for mature fruits. The Sibuyan Visayan name is "Leocum."

General aspects are that of a *Gelonium*, but the generic description is quite different for the staminate flowers in our material.

Gelonium trifidus Elm. n. sp.

Shrub-like; stem 5 m. high, 5 to 8 cm. thick, mainly branched from the middle, rebranched and ultimately widely spreading; wood moderately soft or rather hard, whitish, odorless and tasteless; bark smooth, brown. Leaves coriaceous, descending, flat, lucid bright green above, duller and a trifle paler green beneath, glabrous except the nerves beneath, alternate, only a few at the ends of the smooth twigs, entire, usually acute at apex, rounded or obtuse at base, elliptic, the larger blades 17.5 cm. long, 7.5 cm. wide across the middle, in the dry state retaining its color; petiole 1 cm. long, green, very finely puberulent, midvein prominently raised beneath, glabrous or hairy along the sides, the 7 to 9 lateral pairs ascendingly curved and harbor brownish tufts of hairs in their axils, all yellowish green in the dry state; reticulations quite evident beneath; bud bracts 1 cm. long, green, linearly acuminate, striate and usually puberulent along the edges. Flowers upon stout, usually 3-branched and recurved tubercles arising from the leaf axils, rigid, caducous; pedicels 3 to 5 mm. long, subglabrous, pale green; perianth of 10 segments, all imbricate, the 5 outer ones usually broader and with finely ciliate margins at least; stamens 5, upon a disk, the free filaments greenish white, anthers yellowish; young fruits subtended by the imbricated perianth segments, bearing the short subpersistent style, smooth, triangularly ellipsoid, 3-seeded, nearly 1 cm. long.

Type specimen 12143, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

This also was collected under similar ecological condi-

tions as the previous species, but is much less common. Indeed it takes close observation to detect that there are in the same locality two quite distinct yet very similar species.

Gelonium meliocarpum Elm. n. sp.

Suberect shrub; stem 5 cm. thick, 3 to 4 m. high; the main branches arising from the middle, quite rigid, sparingly rebranched, divaricately spreading; wood light, white, without odor or taste, easily cutting; bark yellowish gray, minutely checked or lenticelled when old. Leaves horizontal, slightly recurved, nearly flat, dark green above, much lighter so beneath, alternatingly scattered, glabrous, light green even in the dry state, the entire margins subinvolute, diverse in size, gradually acuminate or abruptly acute at apex, the base obtuse or subcuneate, the average blade 12 cm. long, nearly 5 cm. wide across the middle, ovately to oblongish elliptic or the smaller ones broadly lanceolate, both sides similarly puncticulate; petiole stout, glabrous or scurfy beneath, at most 1 cm. long; midvein prominent beneath, the 6 to 9 lateral ones faint, the reticulations scarcely evident. Flowers solitary or in small groups, usually sessile upon short tubercles in the leaf axils or opposite them, odorless, creamy yellow, deciduous, subtended by minute bracts; the 3 outer perianth segments finely ciliate, broad, rounded at apex, 3 mm. long, the inner 2 or 3 usually smaller and hyaline; stamens about 20; filaments subequal, 4.5 mm. long, free, whitish, promiscuously inserted upon a sort of a spongy receptacle, intermixed with small lamellae; anthers broadly ellipsoid, nearly 0.75 mm. long, subbasifixed; fruit subsessile, ascending, axillary, globose, bright red, its thick exocarp white and mealy, 3-celled, 1.5 to 2 cm. in diameter, the seeds black and covered with a whitish membrane, subtended by the persistent segmented perianth; placentae central and also persistent.

Type specimens 12357 in flower and 12075 in fruit, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April and March respectively, 1910.

This undershrub was commonly seen in well drained soil

of wooded or forested ridges at 1750 feet. Number 12309 is the same and was named "Malauna" by the Visayan. Its rather large red fruits coupled with the dark green foliage gives a striking appearance. The fruits are quite similar to some of the *Meliaceae* fruits.

Possibly related to *G. glomerulatum Hassk.*

GLOCHIDION Forst.

Glochidion urophylloides Elm. Leaf. Philip. Bot. I; 300, 1908.

Field-note:—Tree-like shrub; stem 7 m. high, 7.5 cm. thick; main rebranches arising from below the middle, ascending, rather numerously rebranched toward the ends, the twigs green and subangular; wood tough, the thin outer portion sappy, toward the center dull fleshy red; bark reddish beneath the thin scaly deep brown surface; leaves descending, coriaceous, curvingly folded upon the upper much deeper green and sublucid side; inflorescence green except the yellowish odorless flowers; fruits flattened especially on the upper side, 1 cm. across, turning red in the sunlight, 5-celled, each cell with 2 orange red seeds. Common in shrubberies and light woods bordering grass lands at 250 feet. "Hamojuena" is the name given to it by the natives or Visayan.

Represented by number 12056, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, March, 1910.

Glochidion triandrum (Blco.) C. B. Rob. in Philip. Journ. Sci. IV; 92, 1909.

Field-note:—Low, widely spreading and gnarly trees; stem 3.5 m. high, 12.5 cm. thick; the main branches arising from below the middle, widely spreading, crookedly rebranched; twigs slender, lax, green, numerous; wood moderately hard and heavy, reddish brown, odorless and tasteless; bark thick and checked on the stem, smooth on the branchlets; leaves horizontal, recurved toward the ends, shallowly conduplicate on the upper deep green surface, glaucous green beneath; flowers pendulous from the leaf axils, usually 1 to 3-clustered,

of both sexes; staminate ones upon slender pale green pedicels, similarly pale green throughout; the pistillate ones sessile, with green ovaries and the other part of a rich or deeper yellow than the male parts; fruits snow-berry white, flattened, less than 1.25 mm. across, glabrous, 6-celled, each cell contains 2 seeds, bearing the glaucous brown 5-parted of divided styles. In small shrubberies or light woods of wet compact soil of grass lands at 750 feet.

Represented by number 12092, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, March, 1910.

It distinctly differs from Forestry Bureau number 1427 collected by *Ahern's* collector on mount Mariveles in having much longer and narrower male perianth, longer anthers which as in the female flowers are upon short but distinct stalks. The fruits contain 4 to 6 more seeds. The light pleasing upper and glaucous lower surface of the leaves give the flattish tree crown a fine appearance.

Glochidion trichogynum Muell. Arg. in Linnaea XXXIII; 66, 1863.

Field-note:—Slender shrub; stem slendeer, 3, to 5 m. high 3 to 5 cm. thick; branches mainly at the top, rather slender, sparingly rebranched; wood odorless and tasteless, sappy white, soft, with a reddish pith; bark yellowish, smooth or minutely lenticelled; leaves chartaceous, flat or only the apex abruptly recurved, paler green beneath, mostly horizontal; flowers pendulous, in axillary clusters, the short stalks provided with bracts, green, the corolla and stamens yellow. Found in wet stony soil of wooded banks along the Sinuban creek at 1000 feet. Called "Ananok" by the Visayan on Sibuyan.

Represented by number 12321, *Elmer*, Magallanes (Mt Giting-giting), Sibuyan, April, 1910.

HOMALANTHUS A. Juss.

Homalanthus populneus (Geisel.) Pax.

Field-note:—Tree-like shrub; stem ascending, 15 cm. thick,

7. m. high; main branches toward the top, widely spreading, the branchlets subverticillate, lax, suberect, forming a flattish crown; wood very soft, poplar white and light, odorless and tasteless; bark brown, smooth or lenticelled on the branchlets; leaves copious, upon horizontally spreading red petioles, the blades descending, submembranous, usually conduplicate on the upper deep velvety green surface, glaucescently green beneath; inflorescence ascending, the spikes usually curved, green except the odorless and yellowish flowers. In red compact soil of shrubberies on low hills at 750 feet. The natives call it "Balantig."

Represented by number 12499, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, May, 1910.

HOMONOYA Lour.

Homonoya riparia Lour. Fl. Cochinch. 637.

Field-note:—Shrubs 1 to 3 m. high, with several 3 to 8 cm. thick stems; stems usually branched from near the base, rebranched and widely spreading in a willowly fashion; wood very soft, whitish, without odor or taste; bark smooth, brown, with a green layer beneath the epidermis; leaves slightly ascending, nearly flat, membranous, shining deep green above, grayish so beneath; spikes strictly ascending, odorless, brownish or reddish in the bud state. In sand gravelly soil along the Pauala river bed at 750 feet.

Represented by number 12144,[a] *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, March, 1910.

MACARANGA Thouars.

Macaranga sibuyanensis Elm. n. sp.

Erect tree; stem 2 dm. thick, 7 m. high; main branches from above the middle; the numerous branchlets ascending, smooth and green, slender, forming a flattish crown; wood very soft or pulpy, light, pale white, without odor or taste; bark easily stripping, smooth or lenticelled, mottled gray on the stem and main branches. Leaves copious along the

ends of the twigs, alternate; petiole ascending, turning bright red on the exposed sides at least, 5 to 8 cm. long, smooth, shining, terete; blades membranous, descending, usually somewhat folded upon the upper pleasing green surface, beneath glaucescent, drying grayish green, ovate with slender caudate tips, entire margins, roundly obtuse at the base which is provided on the upper side with a pair of elongated glands, glabrous, pellucid glandular beneath, 15 cm. long, 6.5 cm. wide below the middle; stipules of merely hairy vestiges; midvein prominent, with 5 to 7 oblique lateral pairs, tips obscurely united, the cross bars also very faint. Racemose spikes suberect, glabrous, solitary from the leaf axils, ours only pistillate, 1 dm. long in anthesis, much longer in the fruiting state, flower bearing from above the middle toward the apex mostly; flowers in small groups, subtended by a slenderly petioled foliaceous bract prominently glandular on the upper basal portion; pedicels ascending, subglabrous, averaging 7.5 mm. long in the flower, 2 cm. in fruit; calyx relatively small, subglobose, 1 mm. long, obscurely dentate; ovary covered with a light sulphur yellow bloom, as long as the calyx and similar in shape, bearing at the apex a very thick hood-like pulverulent stigma; fruit globose, dark green beneath the glandular coat, 5 mm. thick with the persistent brown stigma; staminate flowers not seen.

Type specimen 12264, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

Only once seen in damp reddish soil with a rocky subsoil, along wooded banks of the Patoo river at 750 feet.

Differentiated from *M. cuneata Elm.* by its caudate acuminate leaf points, bases broadly obtuse not cuneate, much longer petioles, conspicuous glands which are different in color. Neither is it *M. caudatifolia Elm.*, because of the foliage and inflorescence.

Macaranga tanarius Muell. Arg. in *DC.* Prod. XV^2; 997, 1862.

Field-note:—Low spreading tree; stem 7 m. high, 2 dm. thick; its main branches arising from below the middle, rebranched, the ultimate ones ascending, forming a flattish

crown; wood very soft, white, light, odorless and tasteless, with a large brown pith; bark smooth, yellowish gray, green on the branchlets; blades descending, submembranous, usually folded upon the upper surface, grayish or subglaucescent beneath; infrutescence ascending or erect, green; stipules pale green, caducous; young fruits covered with a grayish or yellowish green bloom; bracts of the same color; seeds smooth, coal black. "Binanga" is the vernacular Visayan name. Quite common in fertile sod lands of shrubberies or light woods at 500 feet along the Pauala river.

Represented by number 12545, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, May, 1910.

Possibly those forms with soft pubescent under leaf surfaces should be referred to *M. tomentosa Muell. Arg.*

MALLOTUS Lour.

Mallotus playfairii Hemsl. in Journ. Linn. Soc. XXVI; 441, 1891.

Field-note:—Very common in more or less sandy soil of thickets and light woods skirting the coast.

Represented by number 12545[a], *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, April, 1910.

Mallotus korthalsii Muell. Arg. in *DC.* Prod. XV^2; 976, 1862.

Field-note:—Erect shrub-like tree; stem 5 cm. thick, 5 m. high; branches spreading, rebranched, mostly above the middle; wood rather soft, yellowish white, without odor or taste; bark smooth and yellowish gray; leaves chartaceous, diverse in size, ascending or horizontal, paler green beneath, usually folded upon the upper side and with recurved tips, margins wavy, drying light green, beneath beautifully glandular; inflorescence erect, 5 or more cm. long, simple or with few short branches toward the base, stalks green, bearing deciduous yellow flowers. Collected in red compact well drained soil of a forested ridge at 1000 feet.

Represented by number 12348, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, April, 1910.

Only known from two other localities in the Philippines, namely from the district of Zamboanga, Mindanao, and from the province of Cagayan, Luzon.

Mallotus echinatus Elm. n. sp.

Erect tree; stem 14 cm. thick, 7 m. high; branches from above the middle, the limbs freely and laxly rebranched; wood moderately hard, odorless and tasteless, brownish toward the center; bark smoothish, blotched. Leaves mostly at the ends of the glabrous twigs, opposite or subopposite, submembranous or chartaceous, flat or only the acute or slenderly acuminate tips recurved, sublucid above, paler green beneath, glabrous, curving, dull green, the margin entire, base acute to obtuse, oblong or linear so, quite variable in size, 15 cm. long, 4 cm. wide across the middle; petiole also glabrous, 1 cm. long, green and terete except the thickened ends; midvein prominent beneath, about 10 lateral ones on each side, divaricate and ascendingly curved, cross bars obscure; bud bracts setaceously acuminate, 7.5 mm. long, sparsely puberulent. Pistillate flowers axillary or leaf opposed, usually solitary; pedicel glabrous with only short glandular hairs, bracteate from the base, arising from very short obscurely bracteated pseudotubercles, nearly 2 cm. long in flower, doubling its length in the fruiting state; perianth united only at the very base, the 3 mm. long setaceously acuminate, 5 to 7, more or less unequal, reddish and subglabrous segments stellately spreading ovary with 5 purple papillae covered parts alternating with the rich yellow puberulent streaks; style 1 to 2 mm. long, bearing 3 slender usually curved and similarly colored stigmatic arms 1.5 cm. in length; the scurfy excrescences along the divergent stigmas light pink; fruits flattish, with sunken apex, 1 cm. high, 1.5 cm. across, echinate, 3-celled and 3-seeded; seeds globose, smooth, brown, 5 mm. in diameter; staminate flowers upon short spikes, about 3 cm. long; the subglabrous rachis bracteate and similarly red; pedicels 1.5 mm. long, usually solitary from the axils of the bracts; perianth very diferent; segments 4, nearly free, 4 mm. long, 2 mm. wide, ovately elliptic, similar in color

and hairiness; stamens averaging 60; filaments light yellow, glabrous, 2 mm. long; anthers 0.75 mm. long, truncate and lobed at both ends especially the upper, attached at the middle dorsal side, 2-celled, dehiscing by lateral slits, very deep yellow.

Type specimen 12253, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

This elegant *Mallotus* was discovered in gravelly soil of wooded banks of the Adamagon creek at 1000 feet. Number 12194 is the same and was called "Beli" by the native Visayan.

Its affinities lie with *M. cumingii Muell. Arg.* and *M. eglandulosum Elm.*

OSTODES Blm.

Ostodes serrato-crenata Merr. in Philip. Journ. Sci. IV; 283, 1909.

Field-note:—A rather small erect tree; stem 10 m. high, 2.5 dm. thick, subterete; branches mostly above the middle, spreading, rebranched, the ultimate ones slender and with suberect tips; leaves ascending, chartaceous, nearly flat, much paler green beneath, tips twistingly recurved, the dark green terete petiole thickened at both ends; inflorescence composed of terminal pendulous stalks, equal to an arm's length, the more vigorous ones occasionally short branched at or near the base; flowers deciduous, in alternating clusters, maturing at different time; calyx yellowish with green median tips; corolla creamy white; infrutescence terminal, pendulous, the flexible stalk 6 dm. long; fruits upon 2.25 cm. long pedicels, walnut green, triangularly subglobose, at least 2.5 cm. thick, subtended by the 5 green more or less cogged calyx segments, 3-celled and 3-seeded. In well drained clay of a forested incline at 1750 feet along the trail toward España. The flowering specimen was collected in a fertile forested flat at 750 feet about Magallanes.

Represented by numbers 12366 in fruit and 12482 in flower, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, April and May, 1910.

PHYLLANTHUS Linn.

Phyllanthus buxifolius (Blm.) Muell. Arg. in Linnaea XXXII; 50, 1863.

Field-note:—Lax shrub; stem 1 to 3 m. high, 3 to 5 cm. thick, terete, occasionally branched from the base; branchlets crooked, relatively short, twigs green; wood slightly fetid and bitter, sappy white; leaves ascending, rather numerous along the branchlets; leaflets flat, also ascending, coriaceous, shining on both sides, much paler green beneath; flowers pendulous, greenish yellow; fruits also pendulous, greenish, flattened, 1 cm. across, 6-celled, upon a conspicuous yellow calyx disk, each cell with 2 smooth plano-convex seeds. Very common in sand gravelly soil mixed with earth along all wooded water courses. Quite ornamental!

Represented by number 12082, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, March, 1910.

Phyllanthus rupicolus Elm. n. sp.

Erect or suberect suffrutescent perennial; roots ample, slender, branched, flexible; stems solitary or several from the same root cluster, varying from 1 dm. to 1 m. in height, the central ones erect, the outer ones usually curved, terete, less than 5 mm. thick, unbranched; wood soft, greenish brown, with a relatively large pith, covered with smooth nearly shining brown bark. Leaves crowded at the top, the upper ones ascending, the lower horizontally spreading, varying from a few to 10 cm. in length; rachis subterete, light green, usually curved, the lower side toward the base provided with membranous setaceous brown bracts, the base copiously subtended by similar though larger bracts, 5 mm. long; leaflets very numerous and closely set, drying greenish, flat, ascending, glabrous, submembranous, subglaucous green beneath, inequilateral, 6 mm. long, 2 mm. wide below the middle, lanceolate oblong, glabrous, short but distinctly petioled, the lower side narrower and straighter, the entire margins usually inclined to curve upon the upper side, apex acute and occasionally with slender points, base inequilaterally obtuse or

subrotund; the lower subtending bracts united, terminated by slender very fine points; those along the upper side thicker, very short and blunt; midvein quite prominent, with 7 to 11 rather faint lateral oblique pairs. Flowers pendulous, solitary from the axillary lower side of the leaflets, yellowish green, united, subsessile, subtended at the base by fine brown colored bracts; perianth segments oblong, with obtusely truncate apices, 0.75 mm. long, subequal; ovary short stipitate, depressed at the apex, the disk obscurely divided into 3 shallowly bilobed compartments, glabrous, subtended at the base by subsessile anther-like glands; ripe fruit 2.5 mm. in diameter, flattish, globose, yellowish green, subtended at the base by 6 perianth segments, bearing at the apex 3 very short divergently flattened barely forked brown colored stigmas, 3-celled, 4-seeded.

Type specimen 12240, *A. D. E. Elmer*, (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

This elegant and finely leaved *Phyllanthus* was found rather abundant in shale rocky crevices of very deeply shaded cliffs near the water's edge of the Dulangan creek at 750 feet. Seen in several places along cascades of the above named creek only.

It is a very close relative to a specimen in the herbarium, Bureau of Science, marked *P. erythrotrichus C. B. Rob.*, but leaflets much less nerved and inequilateral; rachis only sparsely scaly toward the base, not at all pubescent along the lower side.

Phyllanthus sibuyanensis Elm. n. sp.

Unbranched erect shrub; stem 1 to 2 m. high, terete, 2.5 cm. thick, leaf bearing above the middle; wood soft, greenish white, odorless and tasteless; bark gray, finely checked, green beneath the epidermis. Petioles divaricately spreading, the swollen base dark green, terete, averaging 2 cm. long; rachis subterete, reddish along the upper shallowly grooved side, the lower side of the younger ones finely puberulent, slender, somewhat curved, 1 to 2 dm. long; stipules triangulary acuminate, less than 3 mm. long, thin, brown, caducous; the larger leaflets 3 cm. long, nearly one half as wide

below the middle, the basal smaller ones quite different in shape, membranous, dull green above, glaucous so beneath, flat, entire, alternatingly scattered, ovately oblong to elliptic, inequilateral, the lower side narrower and straighter, apex obtuse, on the larger ones roundly so, base unequally sided and rounded, curing grayish green; petiole 1 to 3 mm. long, usually puberulent especially on the under side, subtended by thin brown acuminate bracts scarcely as long, midvein faint, the lateral ones not evident. Flowers few, fascicled in the axils of the leaflets; the female united, subsessile upon very short densely bracteated stalks, its perianth scarcely longer than 0.5 mm. long; male flowers upon red slender ascendingly recurved glabrous pedicels 1 cm. long or longer; perianth deep red except the pale white fringe, inwardly curved, 4 in number, ovately triangular in outline, 3 mm. long, nearly as wide across the base, also glabrous, the margins laciniate; disk united at the base to the perianth, composed of 4 broadly rounded fleshy lobes, 1 mm. across, 1 mm. deep, red; anthers 4, flattened, rotately attached and forming a disk, dehiscing laterally along the outer edge; fruits not seen.

Type specimen 12113, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, March, 1910.

This lax undershrub was discovered in moist alluvial soil of a wooded flat among other undershrubs along the Pauala river at 750 feet. Not seen elsewhere.

Of our Philippine species it is nearest allied to *P. mindorensis C. B. Rob.*, but sufficiently distinct.

Phyllanthus greenei Elm. n. sp.

A very lax and low undershrub; stem woody, solitary or only few from the same root cluster, 2 to 5 dm. high, terete, brown, very flexible, the larger stems occasionally branched. Leaves horizontally spreading, more or less crowded toward the top, alternate, 7 to 15 cm. long, straight or curved, leaflet bearing from near the base; rachis glabrous, subterete, toward the base with a few scattering bristle-like scales, subtended at the base by 3 setose bracts less than

5 mm. long; leaflets membranous, dull green above, glaucescent beneath, quite similar in color in the dry state, flat, horizontally spreading, glabrous, the entire margin apparently thickened, nearly equilateral, 12 mm. long, 4 mm. wide across the middle, elliptically oblong, obtusely rounded at both ends, the basal portion in many of them a trifle narrower and very slightly inequilateral; petiole less than 1 mm. long, glabrous, subtended by very fine bracts, midvein quite prominent, the faint lateral ones pinnate and from 15 to 20 on each side. Flowers usually solitary from the lower side of the leaflet axils, pendulous, very short stipitate, subtended by united bracts, pistillate only, glabrous; perianth segments 6, oblong with rounded apices, 1.5 mm. long; ovary distinctly stipitate, more or less lobulate, subtended at the base by 6 subsessile anther-like glands; fruits nearly 4 mm. across, subglobose, smooth, green, 3-celled, 3-seeded; seeds 1.75 mm. long, flat and glandularly grooved on the plane lateral sides, the concave side transversely rugose, attached to the ventral edge below the middle, brown.

Type specimen 12399, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910.

Discovered among stones or bowlders of a steep wooded slope at 1500 feet. Named after *Mr. Guy H. Greene*, the road master between Magallanes and España, with whom I spent a number of pleasent days at his camp on the ridge.

Its relation is close to *P. triphlebius C. B. Rob.*, but the leaflets in our specimens are twice as large, broadest across the middle, similarly tapering at both ends, more membranous and glaucous beneath, punctate not reticulate.

SAPIUM R. Br.

Sapium subrotundifolia Elm. n. sp.

Medium-sized tree; stem 2.5 dm. thick, 10 m. high, with a fine bole; branches toward the top only, freely rebranched, forming a dense crown; wood moderately hard, dingy white, odorless, bitter, fine to work; bark yellowish gray, mottled, smoothish. Leaves coriaceous, mostly horizontal,

folded upon the upper deeper green surface, tips very abruptly recurved, the entire margins subinvolute in the dry state, drying dull green, alternate or subopposite, glabrous, subrotund, similarly rounded at both ends, the blades 1.5 dm. long, 8 cm. wide across the middle; midvein prominent, the 4 or 5 lateral ones oblique and strict except their arcuate tips, with few cross bars; petioles ascending, 5 cm. long, terete, thickened at both sides. Flowers not seen; fruits upon short sparingly branched tubercles, smooth, green, hard, obovoidly triangular, 1.5 cm. long, with a short pedicel which at the base is circular and articulate, the apex bearing 3 brown recurved stigmas, normally 3-celled and 3-seeded.

Type specimen 12349, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

This handsome tree was discovered in moist red rocky soil of a densely wooded flat along the Patoo river at 750 feet. Rare!

I am uncertain as to the genus, but apparently it is a relative of *S. lateriflorum Merr.*

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THE OAKS OF MOUNT APO *

BY

A. D. E. Elmer

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The oaks in the vicinity of mount Apo have an altitudinal range of at least 6000 feet—1000 to 7000—and extend from the hill forests, through the rainy forests into the mossy forests. These altitudinal ranges may be designated approximately as follows: hill forests from 1000 to 3000 feet; rainy forests from 3000 to 4750 feet; and mossy forests from 4750 to 7500 feet. The oak species in the hill forests confine themselves to wooded ravines along rivulets—seeking cool moist places. Those in the mossy forests were usually found on ridges or in other well drained soil—avoiding the extremely wet soil on the one hand and the powerful winds on the other and at the same time reaching out for as much light as possible. The greatest development then is in a region where it is cool or temperate, with sufficiently but not too moist soil, enough of light or at least where they have an equal chance with other forest trees and where they are more or less sheltered from heavy or destructive storms. Such an ideal place is the great mount Apo heavily forested rainy basin.

* All my material was submitted to the late *Dr. Otto von Seeman* for determination. Just as he had decided upon the species and was preparing them for publication, he died. It is therefore with a touching feeling of regret that I learn of his death while this article was in his hands for preparation.

In it we find not only by far the greatest number of species, but also the greatest bulk of individuals as well as the greatest development in stature. Under such favorable ecological conditions enormous sizes are found. The bole of one tree of *Q. pseudo-molucca Blm.* measured seventy feet long, five feet in diameter, and appeared to be as round and straight as a lead-pencil. This species is by far the most abundant in these forests. *Q. caudatifolia Merr.* has been seen only once and collected on the Talon side of the range extending from Apo to Santa Cruz on the Davao coast. In this same region were collected *Q. apoensis Elm.*, *Q. monticola King* and *Q. submonticola Elm.* The last two species have exactly the same vegetative characters. Both of them had an abundance of ripe acorns which are as specifically distinct from each other as *Q. celebica Miq.* is distinct from *Q. mindanaensis Elm.* At a lower elevation, *King's* species was more abundant. *Q. tasystachya Miq.* was collected on a gentle forested slope on the Davao side of the Burebid mountains in the mount Apo to Santa Cruz range. *Q. benettii Miq.*, *Q. pruinosa Blm.*, *Q. reflexa King* and *Q. minahassae Miq.* were more or less frequently met scattered in humid forested flats. Here also belong the only two *Castanopsis* species in our district. *C. javanica A. DC.* grew to nearly equal dimensions as some of the larger oaks, and its needle-like spines of the fallen fruits are a menace to the bare-footed natives travelling through the forests. *C. sumatrana A. DC.* is less common than its brother species and extends to lower elevations or into the hill forests.

This, the lower or hill forested belt, harbors fewer species, fewer individuals and smaller trees than the rainy forested belt. *Q. cyrtorhyncha Miq.* was the most common in this region. *Q. celebica Blm.* and *Q. mindanaensis Elm.* were standing side by side with mature fruit which alone is the salient distinguishing character of the two species. The type of *Q. mindanaensis Elm.* is from Surigao, northeastern Mindanao. It is also reported from the Lake Lanao region, and *Dr. Whitford* collected it in the dipterocarp forests seventy-five feet above sea level at Port Banga, Zamboanga peninsula. *Q. zschokkei Elm.* is the rarest of all the species collected and is the only one discovered on sparsely wooded cliffs.

The mossy forested or highest oak belt contains the least number of species. *Q. sundaica Blm.* is the most abundant of all the *Quercus* and *Castanopsis* species in the mount Apo region and is almost entirely confined to the upper belt and reaches the highest elevation or approximately 7250 feet. *Q. apoensis ulayan Elm.* was found only once on a forested ridge of mount Calelan, a densely forested sister peak of the bald Apo and separated from it by the Sibulan river. *Q. pseudo-molucca Blm.*, the finest of all our Philippine oak species, extends considerably into this belt.

The natives make but very little use of these oaks. I have been told that in periods of famine the poorer classes of natives gather the fruit for part of their food. Wild pigs are plentiful and thrive on the acorns. The Bagobo, unlike the Moro, is a great hog eater, but keeps no domesticated pigs himself. The wild hogs furnish the greater bulk of his meat diet, and he enjoys ensnaring them with his native made spear-traps or "Balatic" as it is called. Incidentally, the abundance of these oak fruits keep these forest roaming animals from their depradations in the plantation districts along the coast. In the higher elevations the oak bark is occasionally slabbed off for the construction of small very crude bark shelters. The slender sharp spines of the ripe fruits of *Castanopsis javanica A. DC.* proves a serious menace to the bare-footed native when he travels through the forests. The numerous needle-like spines on the burr average 0.75 of an inch long.

In general, most of the following enumerated species have their home in the rainy middle belt where they average the greatest stature and are most numerous in individuals. Yet such species as *Q. zschokkei Elm.*, *Q. tasystachya Miq.*, *Q. caudatifolia Merr.*, *Q. submonticola Elm.*, *Q. apoensis Elm.* and its variety were only seen and collected once during my six month's exploration in that locality. The last three species were added to my collection just prior to my departure and were collected on a visiting trip to Talon, a Bagobo settlement south of mount Apo and on the general route across the mountains into the Cotabato valley. During May, June and July the greater number of species were in flower, while in August, September and October more species were gathered

in fruit. I regret very much not having succeeded in finding them all in flower, in all of these months, and, what is more important, in full grown mature fruit. These eighteen species of oaks represent the local oak flora of only the southeastern quadrant of mount Apo, and equal in number all other known species in the Philippine Islands.

CASTANOPSIS Spach.

Castanopsis javanica A. DC.

Field-note for 11269:—Large widely spreading tree, 70 or more feet high, with a 4 feet thick stem, in dense forests at 3000 feet; main branches above the middle, crookedly rebranched; leaves chartaceous, mainly horizontally spreading, with recurved tips, shallowly conduplicate on the rich green upper surface, copper brown or yellowish so beneath, lucid above; bark quite rough, yellowish; wood hard, brown except the whitish sapwood, odorless and with a slight bitter taste; fruits upon 6 to 10 inches long spikes, arising from the ends of the twigs, usually only a few from the same place; burrs spinescent, the sharp spines varying from 0.25 to 0.75 inch long or longer, yellowish green, containing 3 seeds. "Cahau-ta-Ulayan" is the Bagobo name.

Represented by numbers 10579 in flower and 11269 in fruit, *Elmer*, Todaya (Mt. Apo), Mindanao, May and August respectively, 1909.

Castanopsis sumatrana A. DC.

Field-note for 11315:—Tall tree, 60 or more feet high, in damp humid forests at 4000 feet, south of the Sibulan river; stem 3.5 feet thick, branched above the middle; the branches widely spreading, rather crookedly rebranched; twigs smooth, brown, rather bendable, suberect; wood hard, dull brown toward the center, with a sourish odor and distinctly bitterish; old bark brown, scaling in plates, on the branches smooth and grayish; leaves coriaceous, shining on the upper darker green and conduplicate surface, recurved especially toward the apex; infrutescence upon erect or ascending stalks, 1 to 6 inches long, 1 to 3-clustered at the terminal portion

of the second year old twigs, brown as are the twigs; fruits only a few toward the ends of the spikes, pale green, ovoid or obovoid in shape, more or less flattened on the sides, fully 1 inch thick across the top, with more than 1 seed. "Linolimon" or "Malabasag" are the Bagobo names.

Represented by numbers 11315 and 11295, *Elmer*, Todaya (Mt. Apo), Mindanao, August, 1909.

QUERCUS Linn.

Quercus benettii Miq.

Field-note:—Tree 40 feet high on forested ridges at 3250 feet of mount Burebid; stem 2.5 feet thick, branched from the middle into main ascending branches whose branchlets are widely spreading; the ultimate twigs green; wood hard, brownish toward the center, odorless, slightly bitter; bark brown, on the branches gray, minutely checked and covered with whitish colored lenticels or excrescences; twigs bendable, ascending, numerous, comparatively short and forming rather dense masses; inflorescence pale creamy yellow, ascending; leaves coriaceous, smooth and glabrous on both sides, ascending, with strongly recurved tips, conduplicate on the upper dark green surface, subglaucescently green beneath. "Ulayan" is the Bagobo name.

Represented by number 11248, *Elmer*, Todaya (Mt. Apo), Mindanao, July, 1909.

Quercus pseudo-molucca Blm.

Field-note for 11460:—A 70 to 95 feet high tree, in dense forests at 4500 feet of the mount Apo basin; stem 4.5 feet thick; its main branches arising from above the middle, crookedly rebranched and widely spreading; bark brown, thinly checked, gray on the branches; wood hard, whitish, without odor or taste; twigs quite rigid or bendable, ascending, numerous; leaves coriaceous, dull or olive green above, flat or only slightly conduplicate, with recurved tips, ashy gray beneath, numerous; inflorescence erect, usually curved, greenish, the branches 3 inches long, the flowers possess a sourish odor; infrutescence upon 1 to 5 inches long rather thick stalks, erect

or ascending; acorns mature, occasionally densely clustered, short ovoid, 1.25 inch across the base, 0.75 inch deep; calyx cup shallow especially the rim, hard, grayish, enclosing the fruit; nut ovoidly flattened, green except the brown apex, otherwise shining.

Represented by numbers 10511, 11460 and 11856, *Elmer*, Todaya (Mt. Apo), Mindanao, May, August and September, 1909.

Quercus tasystachya Miq.

Field-note:—A medium-sized tree, on steep wooded slopes along a dry ridge at 4000 feet of mount Burebid; stem straight, branched mostly near the top, 45 feet high, 2 feet thick; branchlets and twigs ascending, the latter yellowish brown; wood brownish white toward the center, hard, without odor and taste; bark also yellowish brown, more or less covered with wart-like excrescences; branches forming a flattish crown; leaves mostly horizontally spreading, quite rigid, flat or shallowly curved on the upper dull ashy green surface, tips slightly recurved, conspicuously yellowish brown beneath especially along the nerves; inflorescence ascending, similarly colored; the whitish flowers strongly oak scented; acorns dark green and somewhat glaucous, flattish ovoid, tapering to a sharp point, less than 0.5 inch long; cup shallow, rather thin, furfuraceous. "Ulayan" is the native or Bagobo name.

Represented by number 11841, *Elmer*, Todaya (Mt. Apo), Mindanao, September, 1909.

Quercus celebica Miq.

Field-note:—Medium-sized tree, along the upper edge of a wooded ravine of the Baracatan creek at 2250 feet; stem 2.5 feet thick, 45 feet high, branched from the middle; wood hard, whitish on the outside at least, odorless and tasteless; bark smoothish, grayish white mottled, the widely spreading branches covered with gray or whitish lenticels; leaves descending, chartaceous, shining deep green above, much paler green beneath, folded upon the upper side, tips recurved; infrutescence from the second year old leaf axils

or twigs, rather ascending; acorn elongated, at least 1 inch long; its cup shallow, green and covered with soft yellowish brown hairs. This tree grew no more than thirty feet from *Q. mindanaensis Elm.*, number 11922 and apparently is the same as to foliage and general appearance. The acorns however are much longer, even the smaller ones. The fruits of both trees were mature, as the ground was covered with them. The Bagobos also call it "Ulayan."

Represented by number 11923, *Elmer*, Todaya (Mt. Apo), Mindanao, October, 1909.

Quercus caudatifolia Merr.

Field-note:—Small tree, 30 feet high, with a 1 foot thick stem, on a wooded ridge at 3500 feet on the Talon side of the mountain range; bark gray and somewhat mottled, checked longitudinally; wood whitish, streaked with the characteristic black-oak vessels, odorless and tasteless; the main branches arising from below the middle, widely spreading, densely covered with whitish lenticels; twigs numerous, slender and lax, green; leaves copious, descending, shallowly conduplicate on the upper bright green and lucid surface, subchartaceous, beneath much lighter green, the nerves covered with a fine yellowish brown tomentum, tips strongly recurved; inflorescence yellowish white, erect, with an oak odor, slender; fruits upon 3 to 5 inches long spikes, ascending, arising terminally from the second or third year old branchlets; cups yellowish brown, thin; acorns cone-shaped, 0.5 inch long, dark green and covered with a fine yellowish brown tomentum, apex prominent or rather sharp. "Ulayan" is the Bagobo name.

Represented by number 11884, *Elmer*, Todaya (Mt. Apo), Mindanao, September, 1909.

Quercus cyrtorhyncha Miq.

Field-note for 11299:—A 60 feet high tree, in forests along a stream near the Sibulan river at 2000 feet; branchlets numerous, lax, forming a flattish crown, the main branches arising from near the middle and ascending; leaves ascendingly recurved, flat or shallowly conduplicate on the upper dull green sur-

face, tips recurved, much paler or whitish green beneath, thinly coriaceous; infrutescence 6 inches long, erect or ascending, terminal or rather from the uppermost leaf axils; acorns 0.75 inch across, the cup grayish green; wood hard, whitish or brownish toward the center, nearly odorless and without taste; bark thick, mottled, smooth or only thinly checked, reddish beneath the epidermis. "Ulayan" is the Bagobo name.

Represented by numbers 11299 and 11787, *Elmer*, Todaya (Mt. Apo), Mindanao, August and September, 1909.

Quercus pruinosa Blm.

Field-note for 10480:—Tree 60 to 70 feet high, in damp fertile soil of humid woods at 4000 feet; stem 4 feet thick; wood dull white, with brown streaks throughout, hard, heavy, tough; bark brown, mottled, longitudinally lenticelled; crown widely spreading, the main branches rigid; wood tasteless but with a distinct sourish smell; leaves chartaceous, descending, curvingly conduplicate on the upper deep green side, tips recurved, dull ashy gray beneath; inflorescence erect, terminal, yellowish. "Ulayan" is the Bagobo name.

Represented by numbers 10480 and 10866, *Elmer*, Todaya (Mt. Apo), Mindanao, May and June, 1909.

Quercus reflexa King

Field-note:—Medium-sized trees, 35 feet high, with a 1.5 foot thick stem, in rich moist soil of very steep wooded slopes along the Sibulan river at 4000 feet; main branches arising above the middle, ascending, ultimately branched; wood hard, duller white toward the center, heavy, odorless and tasteless; twigs ascending, angularly ridged, covered with a yellowish brown puberulence; leaves descending, chartaceous, conduplicate on the upper rather dull green surface, tips recurved, grayish green beneath, the prominent nerves covered with a similar pulverulence; infrutescence ascending from the uppermost leaf axils, 3 inches long; acorns clustered along the upper portion of the unbranched spikes, 1 inch across, flattish, green except the yellowish reflexed appendages; nut broadly ovoid.

Represented by number 11853, *Elmer*, Todaya (Mt. Apo), Mindanao, September, 1909.

Quercus sundaica Blm.

Field-note for 11679:—Tree, 45 feet high, on a dry forested ridge at 6000 feet of mount Calelan; stem 2 feet thick, branched from the middle; the main ascending branches ultimately widely spreading; the twigs erect, comparatively short, numerous and forming dense bushes; wood hard, whitish on the outside at least, heavy, tasteless, with a faint oak odor; leaves ascending, recurved toward the tips, subchartaceous, curvingly conduplicate on the upper side, sublucid and deep green above, grayish beneath and with yellowish veins; young infrutescence erect, yellowish green as is also the cup which encloses the greater part of the smooth dark green acorn. The Bagobos call it "Ulayan."

Represented by numbers 10512, 11245, 11679, 11810, 10624, 11919 and 11943, *Elmer*, Todaya (Mt. Apo), Mindanao, May to October, 1909.

The above numbers represent at least three distinct species. The first two numbers cited are in young fruit and flower only, and are indentical in foliage which, however, differs from the succeeding five numbers. The last cited number is identical in foliage to the middle series of numbers which I take to be *Blume's* species, but the young acorns are different.

Quercus minahassae Koord.

Field-note:—A large 50 feet high tree, on a wooded ridge at 4000 feet of mount Burebid; stem terete, at least 3.5 feet in diameter; wood whitish on the outside at least, heavy, hard, nearly odorless and tasteless; bark smoothish or lenticelled, yellowish gray mottled, reddish brown beneath the epidermis; main branches arising from above the middle, the ultimate ones quite numerous and suberect; leaves ascendingly recurved, folded upon the upper darker green surface, tips strongly recurved; infrutescent spikes 3 to 5 inches long, ascending or erect, terminal or from the uppermost leaf axils; acorns 0.5 inch across, nearly 0.75 of an

inch long, thickly ovoid; cup covered with yellowish brown hairs. "Ulayan" is the Bagobo name.

Represented by number 11942, *Elmer*, Todaya (Mt. Apo), Mindanao, October, 1909.

Quercus mindanaensis Elm. n. name. *Q. acuminatissima Merr.* in Philip. Journ. Sci. III; 326, 1908 not *Q. acuminatissima A. DC.* (*Q. philippinensis Merr.* in For. Bur. Bul. I; 16, 1903 not *A. DC.*)

Field-note:—Along the upper edge of wooded ravines along the Baracatan creek at 2250 feet; trunk 35 feet high, 1.5 foot thick, branched from the middle, the branchlets widely spreading and grayish white lenticelled; bark smoothish, grayish white mottled; wood whitish on the outside at least, hard and heavy; foliage chartaceous, descending, shining and usually folded upon the upper much deeper green surface, tips recurved; twigs and under side of young leaves pubescent; infrutescence suberect, terminal or from the second year old shoots; acorns mature, short ovoid, scarcely longer than 0.5 an inch, nearly that across below the middle; cups shallow, green and covered with a soft brown tomentum. "Ulayan" is the Bagobo name.

Represented by number 11922, *Elmer*, Todaya (Mt. Apo), Mindanao, October, 1909.

Quercus monticola King

Field-note:—A medium-sized tree, in dense forests at 4500 feet on the Talon side of the range; trunk 40 feet high, 1.5 foot thick; wood hard, whitish on the outside at least, covered with gray smoothish bark; main branches ascending, ultimately numerously rebranched, the twigs erect and yellowish brown scurfy; leaves ascending, coriaceous, flat or only the tips slightly recurved, shining deep green above, much paler beneath; infrutescent stalks ascending, arising from the second or third year old branchlets, 4 to 7 inches long; acorns 0.75 inch across, the nut flattish and covered with a yellowish brown tomentum; cups one half enclosing the fruit. This also the Bagobos call "Ulayan."

Represented by number 11894, *Elmer*, Todaya (Mt. Apo), Mindanao, September, 1909.

Quercus submonticola Elm. n. sp.

A rather slender and medium-sized tree; stem 13 m. high, 4.5 dm. thick; its main branches arising from the middle, ultimately numerously branched, forming an elongated crown; twigs ascending, densely covered with a yellowish brown tomentum; wood whitish, quite hard and heavy, without odor or taste, covered with a smooth gray bark. Leaves alternate, copious, subchartaceous, suberect, flat, glabrous and shining green above, paler beneath, elliptic, 4 to 7 cm. long, 2.5 to 3.5 cm. wide across the middle, the entire margins subinvolute in the dry state, apex obtusely rounded or short acute, base rounded or very short obtuse; petiole short pubescent, 5 mm. long; midrib conspicuous beneath, short yellowish brown pubescent, with 5 to 7 lateral pairs which are puberulent. Infrutescent spikes 7 to 10 cm. long, ascending, usually few clustered from the ends of the two year old twigs, short yellowish pulverulent or becoming glabrate; fruits mostly above the middle, divaricate, 3 cm. long, 15 mm. thick at least; glans oblong, truncate at base, gradually curving to the nipple-shaped apical point, green and covered with a yellowish brown pulverulence, 2.5 cm. long by 1.5 cm. thick below the middle; cup 1.5 cm. deep including the conspicuous stipe, covered with a similar pulverulence, rings evident, more or less beset with apiculations.

Type specimen 11428, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September, 1909.

Discovered in humus covered fertile soil of humid forests at 4500 feet, on the trail towards Talon. The Bagobos call it "Ulayan."

It has the leaves of *Q. monticola King* and the fruits of *Q. ilex Linn*. Both mine and *King's* species were growing side by side and their fruits were mature. Only one tree was observed, while *Q. monticola King* was quite abundant along the same ridge 1000 feet lower down on the Talon side of the mountain range.

Quercus zschokkei Elm. n. sp.

A rather tall tree; stem 20 m. high, 6 dm. thick at least; its main branches arising from the middle, divaricately spreading, toward their ends crookedly and rigidly rebranched; bark brown, gray on the branches, smooth or only lenticelled; twigs not rigid, more or less horizontally spreading, green, glabrous, forming dense masses; wood hard, whitish or somewhat brownish toward the center, without odor or taste. Leaves subchartaceous, alternatingly scattered along the twigs or branchlets, dark green above, lucid, of a grayish green beneath, nearly flat or only the abruptly acute to acuminate apex recurved, caesius colored in the dry state, the entire margins slightly involute, oblong, the larger blades 15 cm. long by 6 cm. wide across the middle, frequently much smaller, base acute to subcuneate or occasionally obtuse, glabrous; midrib prominently raised beneath, straw brown, with 6 to 9 very oblique lateral pairs, the reticulations very obscure, all glabrous; petiole terete, 1 cm. long, stout, also glabrous. Flowers not seen; infrutescent spikes few-clustered at the ends of the second year old branchlets, 15 cm. long, when young covered with a yellowish brown pulverulence, wearing glabrate, erect or ascending, grayish green, the larger spikes occasionally branched; fruits only a few coming to maturity, scattered, flatly obovoid, 17.5 mm. long, 2.5 cm. across the top; glans strongly and similarly compressed at both ends, at first finely brown canescent, ultimately glabrous, at least 1.5 cm. wide and one half as deep, bearing a button-shaped apex; cup with a stout irregular base, thick and ligneous, well overarching the glan and usually entirely covering it, rugose toward the base or on the under side, otherwise ringed, entirely without excrescences.

Type specimen 10846, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, June, 1909.

Of this rare species only one tree was seen on the upper wooded edge of a nearly precipitous slope along the Baruring river at 3000 feet where it joins the Sibulan river. The Bagobos call it "Ulayan." I take pleasure in naming it after *Mr. Theo. C. Zschokke*, forester, Bureau of Forestry.

Apparently it falls in the same section with *Q. curranii Merr.*, but very distinct from that species.

Quercus apoensis Elm. n. sp.

Large stocky tree; stem at least 17.5 m. high, 1 m. thick; main branches arising from the middle, ascending, ultimately widely spreading and crookedly rebranched; twigs or the two year old branchlets rigid, ascending, the young portions green, otherwise grayish and covered with lenticels or excrescences; old oark yellowish gray, smoothish or thinly checked and obscurely lenticelled; sapwood whitish, hard, neither with taste nor odor, streaked with brownish vessels. Leaves rigidly chartaceous, mostly horizontal and recurved especially so toward the short acute or obtuse apex, very deep green on the upper conduplicate side, grayish green beneath, alternate, widely scattering, the entire margins subinvolute in the dry state, the upper side turning nearly black while drying, the lower side takes a characteristic lead color, glabrous, short and abruptly acute at the base, elliptish oblong, the larger blades 16 cm. long, 7.5 cm. wide across the middle, quite often much smaller; midrib conspicuous on both sides, with 6 to 9 ascending lateral pairs, cross bars faint, all dark brown; petiole glabrous, terete or the upper one third flattened and with decurrent leaf bases, 3 mm. thick, 1.5 cm. long. Flowers not seen; infrutescent spikes terminal from the second year old branchlets, suberect, 1 to 1.5 dm. long, stout, woody, 5 to 7.5 mm. thick, yellowish pulverulent but soon becoming glabrate; fruits scattered, divaricate, 3 to 4 cm. long; glans at first covered with a fine yellowish gray pulverulence, dome-shaped, with a broad base, terminated into a stout mucronate stigmatic apex, 2.5 cm. across the base, nearly 3 cm. long; cup 3.5 cm. wide, 1.5 cm. deep, stipe nearly obsolete, usually rugose on the under side, otherwise lamellate especially toward the margins but without excrescences.

Type specimen 11887, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September, 1909.

Collected in dense forests on a gentle ridge at 3500 feet, on the trail from Todaya to Talon and on the Talon side of the mountain range. This also the Bagobos call "Ulayan."

Allied to *Q. merrittii Merr.*, but different in a number of good characters.

Quercus apoensis ulayan Elm. n. var.

A tall stout tree; stem 20 to 25 m. high, 1.33 m. thick, terete, rather crooked, branched from below the middle; the main branches crookedly rebranched, widely spreading; branchlets rigid, densely covered with yellowish gray wart-like excrescences; wood hard, odorless and tasteless, whitish; bark thick, yellowish beneath the epidermis, grayish mottled, minutely checked. Leaves horizontal, deeply conduplicate on the upper very dull green surface, grayish beneath even in the dry state, the upper side turning brown, alternatingly scattered, the entire margins subinvolute, glabrous, flat or only slightly recurved at the abruptly acute or acuminate apex, rigidly chartaceous, base rounded, with short decurrent sides, quite variable in size, the average ones 1.5 dm. long by 7 cm. wide across the middle or a trifle below it, oblong to ovately oblong or the larger subrotund; petiole very thick, 2 cm. long, glabrous, the upper 5 mm. with decurrent leaf sides; midrib conspicuous on both sides, with 7 lateral ascending pairs whose tips are strongly curved, all glabrous and brownish, the cross bars rather faint. Infrutescence terminal or from the uppermost leaf axils of the second year old twigs, 7 to 20 cm. long, sparingly branched, ascending; fruits clustered, frequently grown together, the larger ones 2 cm. across; glans flattish, broadest at the base, bearing a prominent mucronate point, more or less covered with a yellowish brown pulverulence; cup without stipes, grayish green, lamellate especially toward the margins where it bears some scattering teeth-like excrescences.

Type specimen 11811, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September, 1909.

This splendid oak stood on a steep bench leading up a densely wooded ridge at 5500 feet of mount Calelan. Rare! This as all other true oaks the Bagobos know as "Ulayan."

In foliage it is very similar to the preceding, but the falling acorns are much smaller and different in shape.

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LEAFLETS OF PHILIPPINE BOTANY

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NEW AND INTERESTING GESNERACEAE

BY

A. D. E. Elmer

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In article twenty-seven of these Leaflets were enumerated the *Gesneraceae* from the Horn of Negros—listing seventeen species of which fifty per cent were described at that time as new. It was indicated that most of our Philippine species prove new to botanical science, especially of certain genera. In the mount Apo region which has the richest and most interesting flora of any other equal mountainous area in these islands, the writer collected twenty species of this family, fourteen of which are here proposed as novelties.

Typical *Rhynchoglossum klugioides Clarke* was only once seen, and grew in masses in rich moist humus covered soil along the Colon creek of dense mossy forests. *Isanthera discolor Maxim.* has often been met between 2000 and 3000 feet altitude. *Paraboea ridleyi Elm.* is here described for the first time, and formed dense clusters on the upper edge of a bluff along the Sibulan river at about 1000 feet altitude, where the cool wind of the river current was constantly felt. *Stauranthera philippinense Elm.* is likewise here reported and described for the first time; only a few plants were noticed here and there in water soaked fine gravelly or sandy soil along streamlets in darkly shaded ravines. Of *Trichosporum philippinensis (Clk.) O.K.* only one plant was found in the rainy forests at 3750 feet. The exquisite *Trichosporum cardinale Copel.*

was rediscovered in its type locality. *Trichosporum asclepioides Elm.* is here described as new, and was occasionally seen as an epiphyte in the rainy forests. This region is also the topotype of *Dichrotrichum glabrum Copel.* My *Dichrotrichum clarkei* has several times been noticed as a heavy succulent epiphyte in these same forests. *Dichrotrichum calelanense Elm.* was discovered in the moss laden elfinwoods on the summit of mount Calelan. Only two of the twelve species of *Cyrtandra* here listed were collected on Sibuyan island, the balance on mount Apo; and all of them are herein described as new, although a few of them are only critically distinguished from other allied species or groups of closely related species.

RHYNCHOGLOSSUM Blm.

Rhynchoglossum klugioides Clarke

Field-note:—Succulent herbs, in rich moist humus covered soil of dense forests along Colon creek at 5000 feet in the mount Apo mossy basin; stem reclining and taking root toward the base, ultimately suberect, branched, the larger ones 1 inch thick, green, juicy; leaves ascending or horizontal, exceedingly unequal in size, flat or slightly folded upon the upper darker green and subvelvety surface, dark brown or nearly black when dry; inflorescence erect, rather short; the stalks, bracts and calyx green; flowers odorless, divaricate, the corolla azure blue and with a whitish blotch on the lower lip. "Cabeddaya" is the Bagobo name.

Represented by number 11570, *Elmer*, Todaya (Mt. Apo), Mindanao, August, 1909.

In this genus there are two fertile stamens, while in *Klugia Schlecht.* there are four. Two of the three known species of *Rhynchoglossum Blm.* are endemic in the Philippines.

ISANTHERA Nees.

Isanthera discolor Maxim.

Field-note:—Low suffrutescent perennial, in moist fertile humus covered soil of dense woods at 3750 feet; stem reclining,

smooth, yellowish, the size of a man's small finger, sparingly branched; the branches ascending or erect; leaves crowded toward the ends only, horizontal or slightly ascending, flat, submembranous, dull green above, alternate, much lighter green beneath, the nerves covered with yellowish appressed hairs; inflorescence horizontal, all the stalks and calyx densely covered with silky brown hairs; flowers subpendulous, odorless; petals pure white; filaments also white, bearing light yellow anthers; pistil greenish. "Tabis" is the Bagobo name.

Represented by number 11700, *Elmer*, Todaya (Mt. Apo), Mindanao, September, 1909.

This genus is primarily distinguished from *Rhyncotechum Blm.* by the alternate leaves. *R.* (*?*) *tenue Clarke* was collected in the vicinity of Manila.

PARABOEA Ridl.

Paraboea ridleyi Elm. n. sp.

Low, perennial herb; stems usually more than one from the same root cluster, 15 cm. long but frequently much shorter and occasionally longer, 1.25 cm. thick, loosely attached to the soil by the numerous wiry roots. Leaves densely clustered at the top, subalternate, spreading in a rosette manner, flat or shallowly concave on the grayish yellow under surface, coriaceous, the upper dark green surface crinked by the strongly projecting veins beneath, very variable in size, grayish, lanose on the upper side but nearly glabrous in the old leaves, beneath densely cremeus lanose, margins entire or coarsely and obscurely dentate, oblong to ovately oblong, the average blades 1 dm. long, at least 4 cm. wide across the middle or below it, obtuse or bluntly acute at apex, base cordate or obliquely obtuse with inequilateral sides; petiole stout, similarly hairy, varying from 1 to 7 cm. long; midrib conspicuous beneath, with 7 to 9 oblique and conspicuously crinked lateral pairs which are usually forked above the middle. Inflorescence erect, from the uppermost leaf axils, cymosely paniculate above the middle; peduncles 1 cm. long more or less, brown, subcompressed and grooved along the upper side, short, glandularly hairy; branchlets subtended

by glabrate oblong or linearly oblong bracts; pedicels filiform, up to 1 cm. long, glabrate or finely glandular hairy; flowers terminal, chiefly 3-clustered, buds pendulous, erect and odorless, light blue, quite delicate; calyx glabrous, the 5 segments spreading in a star-shaped manner, 3 mm. long, subequal, acuminately tapering from the united base; corolla short campanulate, glabrate or with fine glandular hairs scattered over the outside toward the base; segments 5 mm. long, nearly equal in length, apex roundly obtuse, broadly elliptic, the upper one slightly shorter and narrowest, the lower 2 united to above the middle, all united at their bases; stamens 2, fertile, arising from the basal upper side of the ovary; filaments flattened, glabrous, 4 mm. long, ascendingly curved; anthers 2.5 mm. across, connivent at the apex, basifixed, obliquely dehiscent on the upper ventral side; ovary glabrous, oblong, conical, bearing a suberect 2 to 3 mm. long, style; capsule terete, yellowish brown, 2.5 cm. long, the distal 5 mm. much constricted or beaked, ascending, glabrous, straight, both septal halves containing numerous seeds; seeds light brown with deeper brown ends, 0 33 mm. long, irregular but mostly oblong, minutely pitted, without hairs.

Type specimen 11145, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, July, 1909.

Growing in masses among shrubs in gravelly earth on nearly precipitous banks along the Sibulan river gorge at 1000 feet and bordering the cogon formation. Dedicated to *H. N. Ridley*, the author of this genus.

Nearest related to *P. vulpina Ridl.*

STAURANTHERA Blm.

Stauranthera philippinense Elm. n. sp.

Dirty succulent herbs; stem usually reclining and taking root at the base, 7.5 mm. thick, dull green, watery, unbranched, glabrate except the short and rather dense crisp hairs toward the apex, 1 to 3 dm. high; roots fleshy. Leaves at the top, alternate, 1 to 4, descending, limp, flat, dark green above, much lighter beneath even in the dry state, 10 to

13 cm. long, 3 to 5 cm. wide across the middle, distinctly inequilateral and subfalcate, acute at apex, base obliquely rounded and inequilateral, usually provided with opposite small leaf-like bracts, entire or obscurely and irregularly dentate along the lower side; petiole 5 to 10 mm. long, crisply grayish green pubescent; midvein conspicuous beneath, with 5 to 9 ascendingly curved lateral pairs, reticulations coarse but quite evident beneath, all puberulent. Inflorescence terminal, erect, 1 dm. long or less, branched above the middle; peduncles few to several cm. long, crisply puberulent, subtended by bracts toward the base; branches strict, ascending, similarly pubescent, very sparingly rebranched, the lower ones subtended by conspicuous bracts; the larger pedicels 1 cm. long, strict, subtended by minute bracts or more commonly without them; flowers subpendulous, odorless; calyx glabrate or soft and short pubescent on the outside especially toward the base, veiny, 1.5 cm. across, the 5 acutely pointed segments united and rotately spreading; petals 5, ovately oblong or merely oblong, azure blue except the whitish margins, 7.5 mm. long, early falling; stamens 4, all fertile; filaments glabrous; anthers broadly cordate and basifixed, introrse, dehiscent obliquely or transversely when the 2 cells are well separated; ovary compressed, globose, puberulent, falsely 4-celled; ovules numerous, on 4 fleshy receptacles; style short and thick, puberulent; stigma disk-like, with 2 yellowish rugose excrescences on the upper side, the margins of the rim short; fruit flatly conical, glabrous, circumscissile dehiscent, fimbriate or nearly smooth; seeds brown, obscurely pitted, 0.5 mm. long, angularly oblong or with conspicuous fusiform ends especially the distal one.

Type specimen 10742, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, May, 1909.

Collected in mud-gravelly soil along the Baruring river at 3500 feet or upon seepage well shaded cliffs along the same river. "Tumbekai is the Bagobo name.

S. ecalcarata R. Br., but leaves not purplish tinged beneath, averaging narrower, all alternate and distinctly petioled, gradually not abruptly tapering toward the apex; pedicels mostly without subtending bracts; ovary not pilose; seeds different in shape.

TRICHOSPORUM Don

Trichosporum philippinensis (Clk.) O.K.

Represented by number 11705, *Elmer*, Todaya (Mt. Apo), Mindanao, September, 1909.

This climbing vine is rare in the forests at 3750 feet toward Mainit creek of mount Apo, and is not at all typical. Common in the mountainous sections of northern Luzon. The Bagobos call it "Tapol."

Trichosporum cardinale Copel.

Field-note:—Straggling epiphytes upon small trees and shrubs 3 to 10 feet from the ground of forested ridges at 6000 feet of mount Calelan; branches lax, descending, breaking with a snap, quite numerous and forming loose bushes; leaves coriaceous, dull green above, yellowish so beneath, flat, tips slightly recurved; pedicels and calyx greenish, erect or suberect; corolla curvingly erect, rather soft in texture, the lower and lateral tips recurved or reflexed, cardinal red on the exterior, spotted and streaked with darker red on the interior toward the throat; filaments pale red; style reddish, the flat stigma greenish. It was observed repeatedly in the rainy and mossy forests, and always with a few flowers only which are of a very pretty pleasing color. The Bagobos call it "Colela."

Represented by number 10619, *Elmer*, Todaya (Mt. Apo), Mindanao, May, 1909.

Trichosporum asclepioides Elm. n. sp.

Epiphytic from the rootstock mass of *Lecanopteris pumila Blm*; stems several, sparingly branched, flexible, grayish white, 5 to 8 dm. long. Leaves very thick, rigid, glabrous, the sharply acuminate tips recurved, yellowish green on the upper side, much paler beneath and with a dark purple midrib, opposite, widely scattering, 1 dm. long by 3 cm. wide across the middle, lanceolate or the larger ones oblongish or the basal much reduced and subelliptic, the entire

margins subinvolute in the dry state, drying similarly brown on both sides, cuneate at the base; petiole less than 1 cm. long, glabrous; midrib conspicuously brown beneath when dry, the 3 to 5 ascending lateral pairs very obscure from beneath, more evident from the upper side. Inflorescence in small axillary fascicles or terminal, yellowish green, suberect, not rigid, odorless; pedicels 1 cm. long, more or less ridged when dry, glabrous, subtended by small bracts; corolla greenish with purple streaks on the inner side, glabrate except the ciliate margins of the lobes and with crinked hairs in the tube toward the base, tubular, nearly straight, slightly thickened toward the apex; lobes nearly equal, 4 mm. long, rounded at the apex, the basal sinus much deeper; stamens 4, fertile; anthers oblong, 2.5 mm. long, subbasifixed; filaments attached to the middle of the corolla tube, exerted, glandular hairy except at the distal end and toward the base; ovary glabrous, elongated; calyx 5-segmented clear to the base, subequal, setaceously linear, glabrous, at most 2 mm. wide at the base, 2.5 to 4 cm. long; disk cartilaginous, nearly 1 mm. deep; pod terete, 3 dm. long, gradually tapering toward both ends, numerously seeded in both septal halves; achene 1.75 mm. long, subterete and subcylindric or oblong in outline, pustulate, at the distal end with a single 4 cm. long silky white hair, at the base with a crown of similar hairs but only one half as long.

Type specimen 10492, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, May, 1909.

Discovered in damp deep woods at 4000 feet, growing from the root clusters of other epiphytic vines and herbs clustered about large tree trunks or upon the upper side of the limbs of large trees.

From description it is near *Aeschnanthus motleyi Clarke*, but calyx tube none, its segments twice as long and much narrower. It reminded me of an *Asclepiadaceae* and is called "Culili" by the Bagobos. Quite rare!

DICHROTRICHUM Reinw.

Dichrotrichum glabrum Copel.

Field-note:—Climbing upon a *Pandanus* tree at the

upper edge of the Cati creek falls at 5750 feet of mount Apo; stems numerously branched and interlaced, tightly cleaving to its support; branches terete, covered with smooth yellowish gray bark; leaves descending, flat or only the tips recurved, very deep green and richly shining on the upper surface, very much paler green or even grayish green beneath, heavy, thickly coriaceous; peduncle 1 to 2 feet long, terete, greenish, descendingly curved, flatly forked at the distal end and bearing a few foliaceous bracts; calyx and ascendingly curved pedicels deep red; corolla similarly curved, 1.5 inch long, tubular below the bend, gradually enlarged from the middle to the throat, its 5 lobes merely dilated not rotately spreading or deflexed, purple red except the yellowish tube; filaments yellowish, style very dark red, anthers purplish especially their backs, the recurved stigmatic lobes grayish purple; young fruits 6 inches long. "Talanpong" is the Bagobo name.

Represented by number 11555, *Elmer*, Todaya (Mt. Apo), Mindanao, August, 1909.

Dichrotrichum clarkei Elm.

Field-note:—Epiphytes upon moss covered trees or among numerous climbers about big tree trunks at 3750 feet, in exceedingly moist forests north of the Baruring river; stems few to several, descending, curvingly ascending toward the tips, terete, 0.75 inch thick, soft, green on the inside, breaking with a snap, covered with a smooth yellowish gray bark; leaves somewhat conduplicate on the upper dark green surface, much lighter beneath, the main veins green and watery, thickly coriaceous, descendingly spreading; inflorescence clustered in the leaf axils, subtended by dull pink bracts, all suberect; pedicels of the same color as the bracts; calyx yellowish green in anthesis, pink tipped in the bud state; flowers erect, odorless; corolla quite soft, curved and somewhat flattened above the middle, greenish yellow, more yellow toward the base, more green toward the apex; filaments dirty white, anthers of the same color; stamens 4, much diverted and upwardly curved; fruit terete, green, pendulous, nearly 1 foot long.

Represented by number 10701, *Elmer*, Todaya (Mt. Apo), Mindanao, May, 1909.

Inflorescent bracts broader and flowers somewhat thicker than in the type; calyx densely sericeous, 7.5 mm. long; the 5 lobes forming an imbricate tube, united at or toward the base, obtusely rounded, margins hairy; corolla tubularly inflated, slightly curved toward the apex, 2.5 cm. long, 7.5 mm. thick, pubescent especially toward the throat, nearly glabrous toward the base, with 5 tuflets of hairs on the inside several mm. from the base; its 4 lobes broadly elliptic and suberect; the lower or fifth one narrower, strongly reflexed, arising several mm. further down; stamens 4, fertile, much exerted, didymous; filaments glabrous, one pair a trifle longer, inserted upon the middle of the corolla tube; anthers oblong, 3.5 mm. long, flattened, basifixed; ovary glabrous, elongated, surrounded at the base by a glabrous fleshy cupular disk; style very short; stigma broadly bilobed.

Dichotrichum calelanense Elm. n. sp.

Stems creeping and forming interlaced masses, the terminal portions grayish white hairy, terete, covered with flaky pale yellowish bark. Leaves alternate but opposed by foliaceous bracts, chiefly scattered along the suberect ends, exceedingly diverse in size, coriaceous, heavy, ascending, nearly flat, much lighter green beneath, drying greenish, the normal blades 9 cm. long, one half of that across below the middle, ovate to ovately oblong, provided on both sides with appressed many septate hairs, obtuse at apex, rounded at the base, coarsely and bluntly dentate except around the base; petioles ascending, grayish pubescent, from a few to 5 cm. long; the midrib with 3 to 7 ascending lateral pairs which are usually forked toward their ends, with only 5 pairs; the bract-like leaf rhombic oblong, hairy on both sides, 1 cm. long, frequently much smaller or nearly obsolete. Peduncles ascendingly curved, setosely hairy, reddish, 1 to 3 dm. long, axillary, usually solitary from the same axils, bearing an umble of flowers at the apex; flowers odorless, ascendingly curved, divaricate, several, subtended by an involucre of foliaceous bracts; pedicels pubescent, 1 to 2 cm. long; their subtending bracts ovately oblong, hairy main-

ly on the outside and along the margins, occasionally smaller ones intermixed; calyx at least 1 cm. long, forming an imbricate tube, villose hairy on the outside, green especially toward the bud, the 5 segments linearly oblong and united toward their bases; corolla yellowish red, 3 cm. long, 4 mm. thick across the glabrous base, 14 mm. across the throat, otherwise pubescent except on the inner side below the middle; throat oblique, the 5 segments subrotund, the lower one reflexed and further separated; stamens 4, didymous, barely exerted; the glabrous somewhat compressed filaments inserted a trifle below the middle; anthers flattish, rotund from the connective side, 2.5 cm. long, attached on the back toward the base; ovary glabrous, strap-like, with a 5 mm. long neck which bears a broadly rounded bilobed stigma, subtended at the base by a glabrous callous rim; pods subterete, smooth, falcate, 1 dm. long, young; seeds with a single hair-like appendage from each end, one brownish the other transparently white.

Type specimen 11347, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, August, 1909.

Creeping and climbing upon moss laden roots, trunks and limbs of the elfinwoods at or near the summit of mount Calelan at 8500 feet. "Tasik-ta-lomot" is the native Bagobo name. Quite common but nowhere else seen.

It forms a very natural alliance with *D. glabrum Copel.* and *D. chorisepalum Clarke* from the Philippines, and *D. ternateum Reinw.* from Ternate island.

CYRTANDRA Forst.

Cyrtandra gitingensis Elm. n. sp.

Succulent perennial herbs or suffrutescent shrubs; stem few or solitary from the root, subterete, yellowish green, heavy and watery, sparingly branched, 1 to 2 m. long, reclining and taking root toward the base, ultimately ascendingly curved. Leaves mostly toward the top, ascending from the base, limp, gracefully recurved, shining deep green above, much paler beneath even when dry, opposite and nearly equal, glabrous on both sides except the nerves beneath, the larger

blades 3 dm. long, 1 dm. wide above the middle, the apex short acute, the base subpandurate and entire, otherwise crenately dentate, the upper side grayish brown in the dry state; midrib stout and pronounced beneath, rufous pubescent, with 11 oblique or ascendingly curved lateral main pairs, these frequently alternating with minor pairs, their tips reticulately united, the coarse yet very evident reticulations more numerous toward the margins, all brown and wearing glabrous; petiole none; the lamina gradually tapering from the middle down to the narrowly rounded base. Inflorescence upon stout rufous brown pubescent 1.5 cm. long stalks; flowers severally clustered and subtended by a pair of pale green ovate foliaceous bracts 3 cm. in length and with conspicuous brown pubescent nerves; pedicels 5 mm. long when in fruit; calyx tubular, thinly membranous, 2 cm. long, brown hairy on the outside, with conspicuous nerves, dissected into 5 slenderly acuminate or setosely pointed segments; ovary 6 mm. long, elongated, glabrous; style twice as long, densely villous, bearing a bilobed stigma; corolla 4 cm. long, ascending, white, deciduous, gradually tapering from base to the rather broad throat, villose on the outside; fertile stamens 2, included; filaments compressed, glabrous, inserted below the middle of the corolla tube; anthers broadly ellipsoid, 3 mm. long; fruit 1.5 cm. long, ovoidly ellipsoid, glabrous, irregularly dehiscing, subtended by a spreading fimbriately toothed disk; seeds indefinite, inserted upon elongated fleshy receptacles, angularly oblong, brown, less than 0.5 mm. long, obscurely blistery.

Type specimen 12369, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

Discovered in moist loose fine gravelly soil of densely wooded stream banks at 1750 feet, near the trail on the España side of the ridge.

A segregate of *C. cumingii Clarke*, and quite different in many characters. It is also specifically distinct from *C. vitiensis Seem.*

Cyrtandra mindanaensis Elm. n. sp.

A sparingly branched shrub, about 2 m. high; stem terete, reclining at the base, 2.5 cm. thick; branchlets few, the ultimate ones suberect, the tips fulvous hairy but soon becoming glabrous; the old bark smooth and yellowish. Leaves opposite and equal in size, chiefly toward the ends of the branchlets, heavy and a trifle succulent, shallowly concave beneath, horizontal, dull green on the upper glabrous surface, paler green beneath and more or less covered with short ferruginous hairs, 2.5 dm. long, 9 cm. wide across the middle or a little above it, obscurely obovately oblong, apex rounded with a short acute point, gradually narrowing toward the decurrent bases, coarsely and unequally serrately dentate, subentire toward the base, in the dry state nearly black on the upper side and dull green beneath; midrib very pronounced beneath, ultimately glabrate, with 11 to 13 ascendingly curved and parallel lateral pairs, fulvous pubescent, reticulations none or very obscure; petiole stout, 1 to 2 cm. long but usually the sides of the lamina are decurrent clear to the base, glabrous in age. Inflorescence axillary, ascending, upon stout 1 to 1.5 cm. long peduncles; flowering bracts greenish, submembranous, tomentosely ferruginous, ovate, 3 cm. long, the inner ones somewhat smaller; flowers numerously clustered; pedicels 1 cm. long, densely hairy; calyx at least 1.5 cm. long, tubular, sericeous pubescent except toward the base, with conspicuous veins, the 5 equal oblong teeth 5 mm. long and acutely pointed; corolla tubular except toward the dilated throat, roundly 5-segmented, pubescent on the outside especially on the tube; pistil glabrate, subtended by a conspicuous disk, ovary oblong, neck short, stigma obscurely bilobed; filaments short, included, glabrous, flattened and wand-like, 7, bearing 2 fertile anthers which are broadly elliptic and 3 mm. long; fruit glabrous, 2 cm. long, broadly fusiform, elliptic in outline, splitting open irregularly; seeds indefinite, in lobed fleshy placentae, oblong in outline, brown, 0.5 mm. long, blistery.

Type specimen 11711, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September, 1909.

This "Pasong-pasong" as the Bagobos call it, was discovered in very rich and moist soil of dense forests at 4000 feet.

Leaves with 11 to 13 lateral nerves, not 7-nerved as in *C. incisa Clarke*, and with much larger inflorescent bracts. Its much larger leaves and glabrous fruits at once distinguish it from *C. philippinensis* of the same author.

Cyrtandra talonensis Elm. n. sp.

Lax shrub, 2 or more m. high; stems and branches covered with smooth or thinly shredded yellowish bark; branchlets lax and spreading, olivaceous pubescent on the younger tips. Leaves coriaceous, horizontal or descending, flat, dull green above on the ultimately glabrous side, 1.5 dm. long by 5 cm. wide across the middle, oblongish, at the apex abruptly terminating into a short acute point, obtuse at the very base but the sides gradually narrowing from the middle toward the base, serrately dentate or apiculate except the subentire margins toward the base, dull green on both sides when dry, beneath appressed hairy especially the nerves, alternate, widely scattering, opposed by 1 cm. long, olivaceous brown pubescent, slenderly acuminate bracts which easily fall off; petiole 1.5 cm. long, caniculate along the upper side, covered with olivaceous hairs; midrib conspicuous beneath, with 7 much ascending lateral pairs, reticulations scarcely evident, all the nerves densely olivaceous brown pubescent. Inflorescent stalk or peduncle slender, arising terminally, axillary or laterally, subpendulous, averaging 3 cm. long, soft umber brown pubescent, at the apex bearing a loose cluster of flowers; the subtending bracts similarly pubescent, subpersistent, the basal pair 6 mm. long, 3.5 mm. across the base, acute at apex, the inner ones much smaller; pedicels 3 to 5 mm. long, densely hairy; calyx 8 mm. long, basal portion united, the 5 oblongish segments terminating into slenderly acuminate tips whose margins are more or less united on the upper side, glabrate on the same side; corolla dull fleshy red, 1 cm. long, tubular except the more or less expanded throat, sparsely pilose except the glabrous basal portion and the outer side of the segments; segments 5, subequal, subrotund or broadly elliptic; fertile stamens 2; filaments inserted in the middle portion of the corolla tube and included by it, much curved, fleshy; anthers oblong, 1.25 mm. long, their connectives glandular; ovary elongat-

ed, the glandular neck about as long, the stigmatic disk subentire, subtended by a glabrous cupular rim; young fruit irregularly splitting open when ripe, 2 cm. long, 6 mm. thick at the base, gradually tapering to the elongated point; seeds numerously imbedded in fleshy pulp.

Type specimen 11899, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September, 1909.

Collected in moist rich soil of a wooded ravine at 3000 feet near the Bagobo settlement called Talon. "Pamagtingan" is the native name.

Closely related to *C. maesifolia Elm.*, but peduncles longer and slenderer, inflorescent bracts much smaller, calyx segments shorter, the red not white corolla only one half as long.

Cyrtandra angularis Elm. n. sp.

Epiphytic shrubs; stems heavy, mostly pendant, 1 to 2 m. long, sparingly branched, curved, the greenish white wood with a large pith, grayish white and 4-angled, the green and succulent tips ascending. Leaves flat, the sharply acuminate tips recurved, thickly coriaceous, lighter green beneath, mostly descending, glabrous, entire, extremely diverse in size, oblong or the smaller ones ovately oblong, frequently subfalcate and inequilateral, the base roundly obtuse or cuneate, drying characteristically brown, the larger blades 2 dm. long by 7 cm. wide across the middle, usually the larger leaf opposed by a much smaller one; midrib stout beneath, only when young sparsely hairy, the largest lamina with 9 ascendingly curved lateral pairs, reticulations none; petiole varying from 1 to 5 cm. in length, soon becoming glabrous; bud bract and very young foliage grayish yellow pubescent. Inflorescent stalk less than 1 cm. long, stout, hairy, solitary in the leaf axils; the outer subtending bracts mostly in pairs, free, ovate, at least 3 cm. long, glabrous or only sparsely hairy on the outside toward the base, occasionally with smaller inner ones, usually 3 to 5-flowered; pedicels few mm. long only; calyx glabrous, 3 to 5 mm. long, tubular, terminated by 3 to 5 teeth; corolla white, rigid, succulent, at least 3 cm. long, glabrous, the upper one half strongly inflated and 1.5 cm. wide, relatively spreading; ovary cylindrically elongated, glabrous, subtended at the base by

a 2 mm. deep cupular disk; style about as long, bearing a flattened subentire stigma; fertile stamens 2, besides 2 filamentous vestiges; filaments very broad, glabrous, somewhat curved, far included, inserted upon the tube below the inflation; anthers flattened, 2.5 mm. long, broadly oblong, the connective with few fine glandular hairs; fruits like sausages, 3 to 5 cm. long, green, terete, ascendingly curved, splitting open irregularly, pointed at the apex, less than 5 mm. thick; seeds broadly oblong in outline, 0.75 mm. long, dark brown, coarsely pustulate, numerous, imbedded in fleshy placentae.

Type specimen 10698, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, May, 1909.

Discovered among numerous climbers about large moss-covered tree trunks in dense humid forests at 3500 feet. "Balingkogay" is the native Bagobo name.

Closely allied to *C. suffruticosa Ridl.*, *C. falcata Ridl.* and to *C. oblongifolia* (*Blm.*) *Benth.* et *Hook.*, but especially to the latter from which it differs notably in having nearly one half dozen less of lateral pairs of nerves which are not at all obscure; inflorescent bracts larger in ours, and with the calyx segments otherwise than linear.

Cyrtandra decussata Elm. n. sp.

Coarse succulent perennial herbs or the basal parts suffrutescent; stem terete, 1 cm. thick, reclining and taking root toward the base, ultimately erect or suberect, sparingly branched, dull green, the young tips badius hairy. Leaves horizontally spreading, flat, rigidly coriaceous, opposite and decussately arranged, deep green on the upper glabrous surface, much lighter or yellowish green beneath, turning to a brownish black when dry, obovately oblong, 1 dm. long by 3 cm. wide above the middle, alternate at the base, obtusely rounded at apex, entire toward the base, sinuously serrate or dentate; midrib very prominent beneath, 5 to 7 main lateral ascending pairs or fewer, reticulations coarse and more abundant toward the margins, all the nerves fuliginously pubescent beneath and darker green on the upper side; petioles 1 cm. long, badius pubescent; the uppermost ones very deep brown or nearly black. Flowers chiefly in the old leaf axils along the stem near

the ground, in small loose clusters; peduncle a few mm. long, pubescent; pedicels similarly pubescent, 7.5 mm. long; the subtending bracts linear oblong or lanceolate, at least 5 mm. long or much shorter, also pubescent; calyx soft in texture, 1.5 cm. long, tubular, hairy, termiuated by 5 setosely acuminate teeth; corolla 3 to 5 cm. long, delicate in texture, the basal one third tubular, otherwise saccate, the 5 broadly rounded segments rotately rounded, brown bristly hairy on the outside, white; fertile stamens 2, inserted in the middle and far included; filaments glabrous, flattened, wand-like; anthers basifixed, sagittately oblong, 2.5 mm. long; ovary much elongated, glabrous, subtended by a smooth cupular disk; style longer than the ovary yet included, densely pubescent; stigma fleshy, flattened, subentire, puberulent above; fruit 1.5 cm. long, fusiform, dehiscent irregularly, surrounded by the persistent calyx; the 2 fleshy placentae contain numerous light brown subellipsoid faintly pitted seeds 0.2 mm. in length.

Type specimen 11704, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September, 1909.

Scattering in very moist or nearly swampy soil of deep densely forested flats at 4000 feet, near the Mainit creek.

It belongs in the same group as *C. humilis Elm.* and *C. attenuata Elm.*, but very distinct from either.

Cyrtandra apoensis Elm. n. sp.

Shrub 3 m. high; stem 7.5 cm. thick or thicker, crookedly branched above the middle; wood odorless and tasteless, soft, watery, whitish or greenish white, with a large brown pith; bark brown, very thinly checked; branches sparingly rebranched, 4-sided, greenish, heavy, glabrous. Leaves opposite, widely scattering, heavy and succulent, horizontally spreading, the upper side glabrous or sparsely hairy when young, the nerves fuliginously short pubescent beneath, exceedingly variable in size, limp, slightly recurved toward the acute apex, otherwise flat, dark green and sublucid above, much lighter or yellowish green beneath, the smaller blades less than 1 dm. long, the largest 4 dm. long, oblong, base obtusely rounded or bluntly cuneate and occasionally a little inequilateral, margins shallowly dentate, drying umber brown;

midrib stout beneath, with 10 to 17 ascending lateral pairs whose tips form a submarginal line, reticulations relatively prominent beneath, all dark brown and hairy; petiole becoming glabrate, from 2 to 10 cm. long. Inflorescence subpendulous, along the stem, in small clusters of subligneous branches from 1.5 cm. to 5 dm. long, only sparingly branched from near the base, wholly glabrous; the ultimate branches slender, usually curved, nodulose every 1 to 2 cm., angularly striate and yellowish gray; pedicels 2 cm. long, usually few from the nodes, shorter in the flowering state; calyx tubular, campanulate, 1.5 cm. long, more or less inflated, green except toward the purplish base; its lobes 5, subequal, 3 to 5 cm. long, triangularly obtuse; corolla cardinal red, 2.5 cm. long, saccate above the middle, subbulbose at the base, nearly straight, the 5 lobes comparatively very shallow and strongly reflexed; stamens 2 fertile and 2 sterile, attached in the corolla tube at about the middle, the fertile ones barely exerted; filaments whitish, glabrous, curved; anthers with purple connectives, ovately oblong, 2.5 mm. long, basifixed; ovary gradually tapering into the thick similarly colored style, subtended by a minute disk, glabrate or puberulent toward the neck; stigma disk-like, thick and fleshy, subentire, dark green; fruit irregularly opening, 2 cm. long, prominently pointed, fusiform; the numerous seeds subellipsoid, 0.33 mm. long, brown and pustulate, imbedded in fleshy lobed receptacles.

Type specimen 11557, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, August, 1909.

First discovered as a hanging shrub upon cliffs at the upper end of the Cati creek falls at 5750 feet; subsequently it was more abundantly noticed as an erect spreading shrub along the same creek further up on mount Apo. The Bagobos call it "Cati-bang-bang."

Allied to the genus *Cyrtandromoea Zoll.* which however has four fertile stamens.

Cyrtandra membranifolia Elm. n. sp.

A lax under shrub, 1 to 2 m. high; stems several from the same cluster, 1.5 cm. thick, reclining toward the base, only sparingly branched; wood easily breaking, greenish;

bark smooth, yellowish; branches terete, 5 mm. thick, soft umbrinus pubescent on the younger portion. Leaves horizontal or curvingly decending, soft, membranous in texture, paler green beneath, dull green in the dry state, opposite, well scattered, soft pubescent on both sides, unequal in size, the normal blades 1.5 dm. long and 6.5 cm. wide across the middle, broadly oblong with acute ends, the basal portion entire, otherwise minutely serrately dentate; midrib conspicuous beneath, with 6 to 8 ascendingly curved lateral pairs, reticulations evident from below; petiole similarly pubescent, 1 to 3 cm. long. Inflorescence few-fascicled in the leaf axils, subtended by bracts; flowers odorless, upon a few mm. long pedicel, subtended by a pair of bracts; bracts 1 cm. long, linear, 1 mm. wide, pubescent as are also the thick pedicels; calyx green, hairy, sheath like, 16 mm. long, the basal one half united into a saccate tube, the very oblique throat slit along the lower side, acuminate, striate; corolla 2.5 cm. long, slightly curved, delicate, the basal one third tubularly constricted, the upper two thirds inflated, sericeous pilose, ascending divaricate, snow white, the lower basal side yellowish and its 5 segments with 2 purplish side streaks, nearly equal, rotately spreading, rotund in outline, 5 mm. long, margins irregularly dissected; stamens 2, well included, inserted upon the corolla below the middle; filaments compressed, rather thick, glabrous; anthers basifixed, ovoid, attached to the inner side of the acute connection; ovary much elongated, glabrous; style nearly as long, pubescent; stigma disk-like, pulverulent; fruit greenish brown, ascendingly curved, sausage-shaped, gradually tapering from near the base to the apex, 2 cm. long, irregular, ly breaking; seeds many, brown, imbedded in a pulp.

Type specimen 11273, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, August, 1909.

Gathered in moist humus covered fertile soil of a gentle forested slope at 2750 feet at the base of mount Calelan. This unique species is rare in our locatily!

Cyrtandra ramiflora Elm. n. sp.

Laxly branched shrub, 2 m. high; stems soft, easily

breaking, gnarly; wood greenish white, pith rather large, turning yellowish red after being cut; bark greenish gray, striately winged and becoming somewhat checked when old; branchlets brown, relatively short and crooked, when young densely covered with badius colored hairs. Leaves scattered along the twigs, opposed by very small blades usually or occasionally without bracts even or opposed by an equally sized leaf, coriaceous, flat, descending, the old ones dull green above, yellowish so beneath, exceedingly variable in size, the largest lamina 13 cm. long by 3 cm. wide across the middle, tawny brown and pubescent beneath especially on the nerves, entire toward the attenuate or obtusely cuneate base, the sharply acute or acuminate tips recurved, the smaller ones lanceolate or oblanceolate, the larger ones oblong with sharp ends, serrately apiculate on the margins except the basal one third; midrib prominently raised beneath, with more or less 9 ascendingly arched lateral pairs whose tips are reticulately united, the reticulations quite prominent beneath, all badius pubescent beneath; petiole 5 to 15 mm. long, similarly pubescent. Inflorescence in the axils of the leaves but mostly in the axils of the fallen leaves on the branches, along the stems or even on the roots, upon woody numerously branched stalks varying from 1 to 10 cm. in length; branches short, crooked, thick, the older smooth and yellowish gray stalks angular, the younger portions badius pubescent; bracts short, similarly pubescent; pedicels in fruit at least 1 cm. long, slender, soft brown hairy; calyx 1 cm. long, pubescent, 5-segmented nearly to the base, yellowish green, lanceolate, the apical margins coalescent; corolla 1.5 cm. long, dilated toward the apex, soft pubescent, deep pink except the whitish tube, deciduous, obscurely bilobed; the upper 3 segments as broad as long, the lower 2 lobes much shorter and nearly as wide; fertile stamens 2, besides 2 filamentous vestiges, scarcely reaching the throat, inserted at the middle of the tube; filaments looping, glabrous; anthers broadly oblong, 1.5 mm. long, the connective on the back hairy, basifixed; ovary glabrous at the base and surrounded by a smooth cupular disk, otherwise finely pubescent, gradually extended into the style which bears a subentire fleshy disk-

like stigma; fruit ovoidly ellipsoid or conically elongated, watery white or yellowish, 2 cm. long, irregularly dehiscent; seeds numerous, imbedded in fleshy lobes, broadly fusiform, light brown with browner ends, pitted, 0.33 mm. long.

Type specimen 10681, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, May, 1909.

The Bagobos call it "Balingog," and it was discovered in very moist and fertile soil of dense forests at 3750 feet, north of the Baruring river. Repeatedly seen elsewhere under similar ecological conditions.

Cyrtandra callicarpifolia Elm. n. sp.

A 3 m. high shrub; stems several or few, branched from the base; main branches ascending, laxly rebranched, the numerous twigs more or less drooping and with suberect tips; wood soft, greenish, without odor or taste, easily breaking, covered with smooth yellowish green or gray bark. Leaves alternate, mostly toward the end of the numerous and comparatively short branchlets, horizontal, recurved toward the abruptly acute apex, thinly coriaceous, dull green on the upper glabrous side, much paler beneath even in the dry state, quite variable in size, oblongish elliptic or oblanceolately oblong, base obtusely rounded, serrately apiculate except the entire basal portion, densely lanose on both sides when young, the larger blades 9 cm. long by 2.5 cm. wide across the middle or a trifle above it; midrib conspicuous beneath, with 5 to 7 ascendingly curved lateral pairs, reticulations obscure, all olivaceous pubescent; petiole about 6 mm. long, soft pubescent. Flowers 1 to 3-clustered from the leaf axils mostly, odorless; pedicels at most 1 cm. long, recurved, greenish and pubescent, subtended by linear to lanceolate, oblong, olivaceous pubescent, subequal bracts nearly equalling the pedicels in length; calyx 7.5 mm. long, brown hairy on the outside, 5-segmented nearly to the base, the tips slenderly acuminate; corolla white or the lower side yellowish in the tube, 7 to 7.5 cm. long, 7 cm. wide across the throat, 3 mm. wide at the base, glabrous except the few scattering hairs on the outside toward the throat; the 5 lobes broadly rounded, 3 mm. long; stamens 2, fertile, well

included; filaments glabrous, curved, one of the two much shorter, the connective glandularly hairy, greenish white, anthers brownish, broadly oblong, 0.75 mm. long; ovary gradually extending into the short rather thick green style, pale green, glabrous toward the base, otherwise glandular pubescent; stigma dark green, subentire, slightly bilobed, disk-like, puberulent on the upper side; the ovary disk glabrous, cup-shaped, 1.25 mm. deep; fruit ellipsoid, 7 mm. long, 4 mm. thick across the middle, 2-celled; seeds minute, very numerous, imbedded in 4 vertical fleshy lobes, oblong, 0.2 mm. long, straw brown, sparsely pitted.

Type specimen 11497, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, August, 1909.

Collected on densely wooded banks of the Cati creek in moist humus covered soil at 5750 feet of mount Apo. "Managchilau" is the Bagobo name. The copious leaves are similar to those of certain species of *Callicarpa*.

Cyrtandra laxa Elm. n. sp.

Lax shrub, 3 m. high; stem several cm. thick, branched from near the base, the main branches ascending and slenderly rebranched, the twigs numerous and somewhat drooping; wood without odor or taste, whitish but turning yellowish when exposed; bark smooth, dirty yellowish or yellowish brown. Leaves flat, mostly descending, limp, very deep dull green above and in the younger state olivaceous hairy, much lighter green beneath and densely so pubescent along the veins, very unequal in size, opposite, only toward the ends of the branchlets, occasionally subfalcate and slightly inequilateral toward the entire and attenuate or short cuneate base, the young leaves and bud bracts densely covered with tawny appressed hairs, the larger margins apiculate and with tuftlets of hairs, the larger blades 15 cm. long by 4 cm. across the middle, lanceolate to oblongish lanceolate; midrib very pronounced beneath, with 7 to 9 much ascendingly curved lateral pairs, reticulations relatively conspicuous beneath, all olivaceous brown pubescent; petiole 1 to 2 cm. long, similar in color and pubescence; flowers in small loose fascicles in the leaf axils; pedicels at most 1 cm. long, hairy, subtended by minute bracts; calyx subcampanulate, 1 cm. long, 5-segmented to

below the middle, bristly pubescent on the outside, the subinvolute margins united toward the apex and forming a setose point; corolla whitish, glabrous, 1.25 cm. long, glabrous, constricted in the middle region, the larger of the segments suborbicular and 3 mm. across; stamens 2, fertile, included; filaments glabrous, strongly curved, inserted upon the middle portion of the tube; anthers ovoidly oblong, 1 mm. long, basifixed; ovary oblong, 4 mm. long, slightly glandular hairy, subtended by a conspicuous glabrous thickened disk; style thick, terete, as long as the ovary, glandular pubescent; stigma subentire, conspicuously disk-like; fruit 8.5 mm. long, short ellipsoid, glabrous, greenish, irregularly dehiscent; seeds very numerous, imbedded in fleshy pulp, light brown, with darker brown ends, short ellipsoid, 0.25 mm. long, minutely pitted.

Type specimens 11585 and 11490, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, August, 1909.

The former number was gathered from precipitous slopes or cliffs along the Cati creek at 6000 feet of Apo; the latter number in a deep limestone cut along the Seriban creek at 5750 feet or about 500 feet below Baclayan camp. For both specimens the Bagobos gave me the name "Tarinagub."

This species closely allies itself to *C. pallida Elm.* from which it is quite distinct in a number of characters. Our species here proposed is specifically distinct from similar specimens collected a few years ago in the province of Benguet, Luzon.

Cyrtandra davaoensis Elm. n. sp.

Epiphytic and pendant from large tree trunks; stem 2 cm. thick, soft and porous; bark yellowish gray, minutely checked longitudinally; wood reddish, odorless and tasteless; twigs slender, sparingly rebranched, drooping and forming loosely tangled masses, the ascendingly curved tips fulvous hairy. Leaves dark green coriaceous, recurved toward the abruptly and short acute tips, beneath much paler, when old subglabrate except the nerves beneath, oppositely scattered along the ends of the branchlets, diverse in size, oblong or the smaller ones lanceolate to ovately oblong, entire, the medium ones 15 cm. long by 4 cm. wide across the middle,

base cuneate, more infrequently obtuse or rounded; midrib conspicuous beneath, with 13 to 17 pinnately ascending lateral pairs whose apices are usually united, all brown and fulvous pubescent, the secondary nerves and reticulations faint; petiole varying from 1 to 4 cm. in length, similarly appressed hairy, ultimately glabrate, yellowish green; bud bracts 1.5 cm. long, covered with cinnamon brown strongly appressed hairs, oblongish. Flowers not seen; fruits 1 to 3-clustered; pedicels slightly thickened toward the distal end, subrecurved, 1.5 cm. long, glabrous, subtended at the base by minute bracts; calyx campanulate, also glabrous, rigidly coriaceous, 1 cm. long, unequally 5-segmented, the teeth averaging 5 mm. long, yellowish green; fruit ellipsoid, 1.75 cm. long, hard, green, falsely 4-celled, bearing a prominent point, irregularly dehiscent; seeds very many, imbedded in the fleshy pulp, brown, mainly ellipsoid in outline, fully 0.5 mm. long, punctate.

Type specimen 10595, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, May, 1909.

"Magamamo" is the vernacular Bagobo name, and was only once seen about a large tree trunk 25 feet from the humid ground, in dense rainy forests at 4000 feet of mount Calelan.

This as well as the preceding are very near relatives of *C. tayabensis Elm.*, yet the leaves on our specimen have 3 to 5 more pairs of lateral nerves, bluntly acute at apex instead of acuminate, and are rather ovately oblong than obovately oblong.

Cyrtandra sibuyanensis Elm. n. sp.

Scandent; stem 1.5 cm. thick, terete, very flexible, sparingly branched toward the top only; branches heavy, the slender ones more or less drooping and with ascendingly curved tips, stout, rufous hairy on the young portions; wood soft, greenish white, with a large green pith, odorless and tasteless; old bark yellowish, smooth, otherwise dark green. Leaves opposite, scattered toward the ends, coriaceous, horizontal or descending, flat, only the sharply acute tips recurved, glabrous and very deep lucid green above, pulver-

ulent and paler beneath, turning brown when dry, the average blades 1.5 dm. long, 5 cm. wide across the middle or a trifle below it, short obtuse at the base, oblong, occasionally a trifle wider below the middle, the basal one third entire, otherwise undulately apiculate or subentire; midrib conspicuous beneath, with 9 to 11 ascendingly curved pairs whose tips form a united submarginal line especially toward the apex, reticulations none, all tawny brown, at first tawny pubescent but soon becoming glabrate, ascending. Flowers upon short bracteate tubercles or branchlets, in either the leaf axils or in the axils of their scars; bracts linearly or lanceolately oblong, much twisted in the brown dry state, olivaceous hairy on the back especially dense on the margins, acuminate, 1 cm. long or much shorter; pedicels slender, 1 cm. long, olivaceous pubescent, glabrate in age; calyx campanulate, glabrous, thick and dark green, 1 cm. long, the 5 acute segments about 5 mm. long, otherwise united; corolla 2 cm. long, pale flesh red, glabrous, much inflated above the middle, nearly straight; segments broadly triangular, obtuse at the recurved apex, 5; stamens 2, fertile, included; filaments glabrous, fleshy, curved, inserted at the middle of the corolla tube, usually with 2 vestiges; anthers with thick dorsal connectives, elliptic oblong, 2.5 mm. long, basifixed; ovary glabrous, fusiform, 6 mm. long, subtended at the base by a thick glabrous rim-like disk; style as long, terete, glabrate; stigma composed of 2 thick orbicular lobes, pulverulent on the stigmatic side; fruit glabrate, ovoidly ellipsoid, nearly 2 cm. long, bearing a prominent mucronate point, irregularly dehiscent; seeds numerous, imbedded in a pulpy mass, blistery, brown, elongated ellipsoid, 0.75 mm. long.

Type specimen 12529, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910.

Climbing upon small trees leaning over a deeply shaded mountain stream at 1750 feet, near the trail to España.

Also a near relative of *C. tayabensis Elm.*, but differs in having broader leaves whose bases are not attenuate nor are the margins entire, reticulations entirely obscure, and with other minor characters.

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NEW AND NOTEWORTHY RUBIACEAE

BY

A. D. E. Elmer

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In the first article of the Leaflets of Philippine Botany, published four years ago, there were enumerated forty-two genera and one hundred and fifty four species of *Rubiaceae*, forty-five of which were therein described for the first time. Since then, botanical explorations in these islands greatly added to this particular family, so that now there are definitely known sixty-two genera and upwards of three hundred and twenty-five species.

Out of the score of genera added to our *Rubiaceae* flora, only two new genera were described, both of which were formerly considered by me under *Urophyllum sablanense* and *Mussaendopsis multiflora*. These have recently been segregated and described by *Mr. Merrill* under *Williamsia* and *Greeniopsis* respectively. Most of the increase in genera is therefore due to the discovery within our limit of such genera previously not known from the Philippines.

Not so with the species, for over fifty per cent of the enormous increase have proved new. Such genera as *Psychotria*, *Hedyotis*, *Lasianthus*, *Ixora*, *Randia*, *Timonius*, *Urophyllum* and *Mussaenda*, yielded the most numerous novelties. While *Oldenlandia*, *Morinda*, *Plectronia*, *Sarcocephalus* are among those yielding the least number of new species. The former series of genera are subalpine and inhabit dense humid forests, and those in the latter series mostly inhabit the lowlands, and

have long since been collected and consequently known. Although we know comparatively little of the entire area of the Philippine low country *Rubiaceae*, yet it can be expected that many additions of genera and already known species will from time to time be collected. Still more ignorant are we of the forested subalpine regions, and judging from past experience we can fully expect that every mountain range still harbors its share of unknown species. At this time then, even an approximate complete list of the actual existing species of such an endemic family, can only be conjectured. The novel feature of our interior subalpine as well as the alpine regions will continue for many years to come. Just recently the writer spent a few month's collecting on Sibuyan island, only a day's trip southward from Manila, and in which collection there are three genera of *Rubiaceae* added to the Philippines and nearly thirty new species.

There are two ways in which every collector falls short of obtaining the most from his explorations. First, the careless way most botanists collect, even those who have made a special study of certain groups. It is the weakness of the general collector to gather the large or showy species first, and gradually as he can eliminate them out of his mind can he observe the smaller, more hidden or rare species. The second is mostly due to too short periods of explorations in definite localities. Even six months in a region of these tropics will hardly permit one to survey carefully into all the crooks and nooks, and naturally a portion of the vegetation will at least be out of season for either flower or fruit, or both. No matter how carefully exploration work is carried on, the paucity or abundance of certain groups in localized areas, will always lend interest in every collection made. For instance, the ferns and orchids are abundantly represented on mount Halcon, Mindoro. On the mountains of Sibuyan island these groups are exceedingly scarce, although these islands are almost in sight of each other. So it also varies on different sides of the same mountain and even in different ravines on the same side of the mountain.

BIKKIA Reinw.

Bikkia grandiflora Reinw. in *Blm.* Bijdr. 1017, 1825.

This interesting species was collected among beach limestone rocks at Mualbual, on the south-west coast of Cebu island, in October, 1909. Distributed under number 12025.

OPHIORRHIZA Linn.

Ophiorrhiza biflora Elm. Leaf. Philip. Bot. I; 21, 1906.

This has more recently been collected in the Cuernos mountains of southern Negros and in the mountains of Benguet, Luzon.

Ophiorrhiza involucrata Elm. Leaf. Philip. Bot. I; 351, 1908.

This characteristic species has recently been collected on the island of Polillo and at Infanta, Tayabas province.

Ophiorrhiza venosa Merr. in Philip. Journ. Sci. II; 304, 1907.

Based upon the author's number 5628, from Mindoro. My number 12372 from Sibuyan seems typical and is the first to be reported from some other island.

XANTHOPHYTUM Reinw.

Xanthophytum fruticulosum Reinw. in *Blm.* Bijdr., 839, 1826. *Merr.* in Philip. Journ. Sci. IV; 328, 1909.

Mr. Merrill has already reduced *Villar's* and *Vidal's* species to *Reinwardt's* Javan species which extends through Borneo to Luzon. The field-note for my number 12365 from Sibuyan island reads:—A low suffrutescent undershrub; stem terete, 1 cm. thick, soft, greenish, 1 cm. high, branched rom below the middle; branches green, lax, terete, widely spreading, sparingly rebranched. Leaves membranous, horizontal, flat, lucid deep green above, very much paler green

beneath. Inflorescence upon short stalks, green except the white corolla, stamens and pistils. Rare, in red stony soil of a moist wooded ravine, along the trail to España at 1750 feet.

OLDENLANDIA Linn.

Oldenlandia pterita (Blm.) Miq. Fl. Ind. Bat. II; 193, 1857. *Hedyotis pterita Blm.* Bijdr. 972, 1826. *Merr.* in Philip. Journ. Sci. V; 243, 1910.

HEDYOTIS Linn.

Hedyotis elmeri Merr. in Philip. Journ. Sci. Suppl. I; 127, 1906.

The type is Forestry Bureau number 2113, collected by *T. E. Borden* on mount Mariveles.

Hedyotis eucapitata Merr. in Philip. Journ. Sci. II; 303, 1907.

Based on *Merrill* 5726 from mount Halcon. So far only known from that mountain.

Hedyotis hispida Retz Obs. IV; 23, 1779-91. *Merr.* in Philip. Journ. Sci. II; 302, 1907.

In the Philippines known from Mindoro and middle Luzon.

Hedyotis leucocarpa Elm. Leaf. Philip. Bot. II; 524, 1908.

Recently the writer collected flowering specimens on Sibuyan island and are being distributed under number 12490.

Hedyotis microphylla Merr. in Philip. Journ. Sci. Suppl. I; 239, 1906.

The type is *Merrill* 4693, collected on the trail from Pauai to Baguio. Common in the mountains of northern Luzon. Rather closely related to *H. benguetensis Elm.*

Hedyotis montana Merr. in Philip. Journ. Sci. II; 304, 1907.

Type collected by *E. D. Merrill* on mount Halcon. Otherwise not known.

Hedyotis parva Merr. in Philip. Journ. Sci. Suppl. I; 239, 1906.

Based upon Forestry Bureau number 4576, collected by *E. A. Mearns* and *W. I. Hutchinson* on mount Malindang. *Elmer* 12356 from mount Giting-giting of Sibuyan island is typical. It is the finest-leaved and prettiest *Hedyotis* in the Philippines!

Hedyotis cagayanensis Merr. in Philip. Journ. Sci. V; 231, 1910.

Based upon Bureau of Science number 7502, collected by *Maximo Ramos* at Pamplona, province of Cagayan, Luzon.

Hedyotis macgregorii Merr. in Philip. Journ. Sci. V; 231, 1910.

Collected by *Mr. R. C. Macgregor* at Pauai, province of Benguet, Luzon, Bureau of Science number 8490.

Hedyotis pilosissima Merr. in Philip. Journ. Sci. V; 232, 1910.

Based upon the author's number 6704, collected at Dumarao, Panay.

Hedyotis vestita R. Br. in *Wall.* Cat. n. 347, 1832. *Sclerococcus lineatus Bartl.* in *DC.* Prod. IV; 435, 1830. *Metabolus lineatus DC.* l. c.

Widely distributed in the Philippines.

Hedyotis whiteheadii Merr. in Philip. Journ. Sci. II; 303, 1907.

Only known from mount Halcon, Mindoro and based upon *Merrill* 5783. How *H. montana Merr.* can be kept distinct is not clear to me.

Hedyotis apoensis Elm. n. comb. *Oldenlandia apoenses Elm.* Leaf. Philip. Bot. I; 17, 1906.

Only known from mount Apo where it is common, and from central Leyte.

Hedyotis yoderi Elm. n. comb. *Oldenlandia yoderi Elm.* Leaf. Philip. Bot. I; 18, 1906.

Known only from *Mr. Yoder's* original specimens collected on mount Midiaas, Panay.

Hedyotis benguetensis Elm. n. comb. *Oldenlandia benguetense Elm.* Leaf. Philip. Bot. I; 18, 1906.

Rather common in the mountains of northern Luzon.

Hedyotis banksii Elm. n. comb. *Oldenlandia banksii Elm.* Leaf. Philip. Bot. I; 19, 1906.

Thus far only collected on mount Banahao and on Canlaon volcano.

Hedyotis magallanensis Elm. n. sp.

Shrub, 1 to 3 m. high, with solitary or clustered stems; stem strict, 1.5 cm. thick, profusely branched from below the middle; wood quite tough, greenish, without odor or taste, with a relatively large pith; bark smooth and green on the branches, becoming yellowish and shredded when old; branchlets lax, horizontally rebranched, the ultimate ones more or less angular. Leaves opposite, scattered all along the twigs, submembranous, flat, glabrous, deep dull green above in the fresh state, much lighter beneath, ovately lanceolate, quite variable in size, the larger ones 5 cm. long including the petiole, nearly 2 cm. wide a trifle below the middle, apex gradually acuminate, base cuneate, entire; lateral nerves 3 to 5, very oblique, slightly arched, obscure even beneath; petiole also glabrous, 3 to 5 mm. long; stipules triangularly lanceolate, terminated into 3 short pectinate segments, glabrous, green, 3 mm. long. Inflorescence upon short pedunculate cymose glomerules, axillary; the peduncle

proper varying from 1 to 3 mm. long, ascending, strict, glabrous; flowers solitary or few, subtended by foliaceous bracts of unequal sizes, subsessile, provided at the base with a fringe of setae-like appendages; calyx in the flower finely puberulous, 2 mm. long, campanulate, its 4 segments acute and one half as long; corolla white, 5 to 8 mm. long, tubular, delicate, sparsely pilose inside about the throat; segments 4, oblongish, apex obtuse, about 3 mm. long, reflexed; stamens 5, subsessilely inserted upon the middle portion of the corolla tube; filaments glabrous, 0.5 mm. long; anthers versatile, whitish, included, 0.75 mm. long, oblong, lobed especially at the base, 0.25 mm. wide; ovary glabrous, brown, obscurely lobed, flattened, 2-celled, with numerous ovules in each; fruits ellipsoid, 4 mm. long including the green 1 mm. long persistent calyx lobes, pulverulent, splitting into 2 cocci; style exerted, glabrous, 5 mm. long; stigma bilobed, more or less flattened, the stigmatic surface granular or velvety; seeds arranged along a central axial placenta, irregularly angled, dark brown or nearly black, 0.5 mm. across, about 12 in each half.

Type specimen 12205, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

An erect shrub in red compact soil of open places in the forests at 1250 feet.

Related to, yet quite distinct from the Philippine *H. parva Merr.* and to *H. havilandi King* from Burma and Borneo, but different in many respects from the latter species.

Hedyotis sibuyanensis Elm. n. sp.

Erect or suberect shrub, 2 to 3 m. high; stems 3 cm. thick, branched toward the top only; branches sparingly rebranched, more or less nodulose, green, smooth, terete, the ultimate ones divaricate; wood soft, greenish white, without odor or taste and with a large brown pith; bark smooth, greenish brown on the stem. Leaves coriaceous, glabrous, flat, tips usually recurved, diverse in size, paler green beneath, the smaller ones lanceolate, the larger ones oblongish lanceolate, averaging 15 cm. long including the petiole, 4 cm. wide across the middle, sharply acuminate, attenuate at the base, entire, well scattering along the branchlets,

opposite; nerves oblique, 5 to 7 on each side of the pronounced more or less brown colored midrib, ending in coarse reticulations; petioles brownish, glabrous, varying from 1 to 3 cm. long; stipule also glabrous, forming an interpetiolar rim, terminating into 3 rather short setiform segments. Inflorescence terminal or subterminal, profusely paniculate; peduncles strict, ascending, glabrous, solitary or in 3's, 3 to 5 cm. long, branched from above the middle; branches and pedicels also glabrous, subtented by bracts; pedicels spreading, usually in 3's, 3 mm. long, slender, subtented by apiculate bracteoles; calyx entirely glabrous, 3 mm. long, subcampanulate, the 4 acute segments 1 mm. long; corolla tubular, creamy white or slightly purple at the base, odorless, 9 mm. long, glabrous without, pilose within especially in the throat; segments 4, oblongish, obtuse at the apex, 4 mm. long with yellow crisp hairs on the upper side; stamens 4, inverted upon the corolla throat; filaments glabrous, flattened, less than 0.5 mm. long; anthers versatile, at least 1 mm. long, oblong with obtuse ends; style glabrous, exerted, with forked style arms; stigmas woolly; ovary glabrous, 2-celled with 2 clusters of ovules, with an apical disk; old cocci 4 mm. long, broadly ellipsoid or rather obovoidly ellipsoid; seeds not seen.

Type specimen 12311, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

An undershrub in clayey soil of a forested ridge at 1500 feet. The natives or Visayan call it "Libatra."

Distinguished from *H. elmeri Merr.* by the thinner more acuminate and differently shaped leaves, more distant venation, much looser panicles and slenderer flowers.

Hedyotis subvelutina Elm. n. sp.

Herbs, nearly 1 m. high; stem green, angular, pubescent; branches widely branched, opposite, the younger portion grayish tomentose. Leaves soft membranous, flat, deeper green above, pubescent on both sides or the basal lower surface velutinous, diverse in size, oblong to elliptish lanceolate, acute at both ends especially toward the apex, margins entire, the larger blades 12 cm. long, 6 cm. wide across the middle; nerves 5 to 8, much ascending, gradually curved, rather faint,

the midvein quite prominent beneath; petioles velvety pubescent, varying up to 2 cm. long; stipules broadly rounded, 7.5 mm. long, tomentose, pectinately dissected. Inflorescence in subsessile axillary clusters; the outer subtending bracts foliaceous; the inner ones with gland tipped pectinate lacinae, all pubescent, pedicels very short; calyx nearly 3 mm. long, campanulate, ciliate pubescent, the upper one half divided into 4 triangularly acute segments; corolla 4 to 5 mm. long, pure white, delicate, glabrous except the pilose hairs in the tube toward the throat and the sparse ciliation about the tips of the segments; these are linearly oblong, obtuse at the apex, 4, about as long as the tube; stamens 4, alternating with the segments; filaments glabrous, 1 mm. long, inserted upon the throat of the corolla; anthers as long, oblong, dorsifixed; ovary disk glabrous, brown, larger; style also glabrous, 3 mm. long or longer, the upper one third cleft; stigmatic portion granular; ovary apparently 2-celled, with 2 masses of conglomerated ovules; fruit not known.

Type specimen 12441, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910.

Suberect herbs in compact well drained soil of dense mixtures of rank herbs and shrubs near a stream at 750 feet. Rare! The Visayan call it "Tomau."

Allied to, yet distinct from *H. macrophylla Wall.*, *H. nodiflora Arn.* and *H. thwaitesii Hook.* Number 1679 *Cuming* from Samar and marked *Allaeophania* appears to be the same species.

Hedyotis gitingensis Elm. n. sp.

Shrub; stem slender, erect, 3 cm. thick, at least 3 m. high; branchlets mostly at the top, divaricately spreading, relatively short, sparingly rebranched, the ultimate ones green and obscurely angular; wood breaking with a snap, whitish, with a greenish pith, odorless; old bark gray, finely checked or shredded. Leaves opposite, more or less crowded toward the ends of the twigs, horizontally spreading, coriaceous or subchartaceous, flat, dark dull green above, much paler or subglaucescent beneath, glabrous, entire, lanceolate, varying in size, 12 cm. long, 15 mm. below the middle, slenderly

acuminate and usually subfalcate toward the apex, the entire margins involute in the dry state, linear lanceolate; petioles glabrous, about 1 cm. long; midvein conspicuous beneath, the lateral 3 to 5 pairs very obscure, subparallel, all arising below the middle; stipules between the petioles, glabrous, less than 1 cm. long, with pectinate segments. Inflorescence in small axillary glomerules, upon very short stalks; involucral bracts foliaceous, of unequal sizes, prominently veined, ciliate pubescent along the margins, the basal sides provided with glandularly tipped segments; pedicels very short, glabrous; calyx 4 to 5 mm. long, campanulate, glabrous, green, veiny, the upper two thirds divided into 4 oblong obtusely pointed segments which are glabrous but with ciliate margins and persistent; corolla conical, exceeded by the calyx, splitting into 4 segments nearly to the base, 3 mm. long, glabrous, rather thick and rigid, triangularly acuminate; stamens also glabrous, subsessile, as many as there are corolla segments and inserted upon them at the base; anthers 1 mm. long, dorsifixed, oblong, bilobed at the base; styles glabrous, relatively short, becoming free at the apex, arising from the center of the rather small disk; fruit dividing into 2 cocci, ellipsoid, 4 mm. long without the calyx segments, glabrous, more or less granular, deep purple when mature; seeds coal black, 8 in each coccus, irregular, at least 0.5 mm. across.

Type specimen 12434, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910.

This very distinct species was discovered in red soil among rocks of a forested wind swept ridge at 2750 feet.

METABOLUS Blm.

Metabolus angustifolius DC. Prod. IV; 436, 1830. *Sclerococcus angustifolius Bartl.* l. c.

In the Philippines known from middle and northern Luzon.

Metabolus radicans DC. Prod. IV; 435, 1830. *Sclerococcus radicans Bartl.* l. c.

Only known from central Mindanao and the Batanes islands.

Possibly this species as well as the preceding should be referred to the genus *Hedyotis*.

SPERMACOCE Dill.

Spermacoce philippensis Willd. Syst. I; 401, 1817. *Metabolus laevigatus DC.* Prod. IV; 436, 1830. *Sclerococcus laevigatus Bartl.* l. c.

In these islands it is chiefly known on Mindoro and in middle Luzon.

This is apparently an ally of the *Hedyotis congesta R. Br.* group.

Spermacoce meyeniana Walp. in Nov. Act. Nat. Cur. Suppl. XIX; 353, 1843.

The type is from Jolo, and in Luzon it is known from the provinces adjoining Manila.

It is somewhat similar to *Hedyotis leucocarpa Elm.*, and is also related to *Hedyotis congesta R. Br.*

GREENEA Wht. et Arn

Greenea longiflora Merr. in Philip. Journ. Sci. IV; 323, 1909.

The type is a single specimen, Forestry Bureau number 9130, collected by *Messrs. Whitford* and *Hutchinson* at Zamboanga, Mindanao, February, 1908.

GREENIOPSIS Merr.

Greeniopsis philippinensis Merr. in Philip. Journ. Sci. IV; 324, 1909.

The type specimen, number 5216, was collected by *Mr. E. D. Merrill* at Borongan, island of Samar, October, 1906.

Greeniopsis multiflora (Elm.) Merr. in Philip. Journ. Sci.

IV; 325, 1909. *Mussaendopsis multiflora Elm.* Leaf. Philip. Bot. I; 14, 1906.

Not known except from the type specimen.

Greeniopsis pubescens Merr. in Philip. Journ. Sci. V; 230, 1910.

Based on Bureau of Science number 7407, collected by *Maximo Ramos* in the province of Cagayan, northern Luzon.

Greeniopsis sibuyanensis Elm. n. sp.

Slender tree; stem 15 cm. thick, 8 m. high, terete; branches chiefly at the top, rather slender, not numerous, spreading, sparingly rebranched; wood moderately hard, heavy, bitter, odorless, dirty white; bark smooth, mottled. Leaves crowded at the tips of the branchlets, diverse in size, thinly coriaceous, nearly equally green on both sides, glabrous above, the entire margins and nerves beneath with soft short appressed hairs in the young state, opposite, nearly flat, the average ones 3 dm. long, 1.5 dm. wide across the middle or a trifle above this, apex gradually tapering into an acute point, base slenderly cuneate, elliptically oblong or broadly obovate; petiole 1 to 2 cm. long, stout, the lower side in the young state short pubescent; stipule subpersistent, 3 cm. long, brown, 1 cm. wide, acuminate, submembranous, glabrous except the dorsal median line which bears short gray woolly hairs; nerves prominent beneath, in the young state short yellowish gray hairy, ultimately glabrous, 15 to 17 pairs, the midvein very prominent, ascendingly arched toward their ends, cross bars and fine reticulations barely evident. Inflorescence terminal, erect, usually exceeding the foliage, thyrsoidly paniculate; peduncle solitary, pale green, usually branched from above the middle, covered with short yellowish gray appressed hairs but glabrous in the fruiting state; branchlets similarly pubescent and branched; pedicels very short and subtended by vestiges of bracteoles; calyx 5 mm. long, 3 mm. thick toward the top, turbinate below the middle, the upper one half di-

vided into 5 elliptic segments which remain even on the fruits; corolla 6 mm. long, yellowish; tube broad, 2 mm. long, subglabrous on both sides; segments short pubescent on the outside, pulverulent on the upper side, throat villous, broadly elliptic, the apical portion much recurved; stamens 5, inserted upon the throat; filaments less than 0.5 mm. long, glabrous, alternating with the segments; anthers 1.5 mm. long, 1 mm. wide, elliptic, 2-apiculate at the base, attached on the back; style 3 mm. long, strict, smooth; stigma short and thick, obscurely 2-cleft, green; fruits of 2 cocci, splitting from apex to base, persistent, terete, short dirty yellowish pubescent on the outside, 5 mm. long.

Type specimen 12073, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, March, 1910.

A fine slender tree scattered here and there in red soil packed between rocks of rather well drained woods along the trail to España at 1750 feet.

It is separated from *G. philippinensis Merr.* in having much thicker glabrous leaves and stipules. To this species more properly belongs Forestry Bureau numbers 18725 collected by *Darling* at Paracale, and 12836 by *Rosenbluth* from Samar; also 1713 *Cuming* from the same island. *Mr. Merrill* writes of his type as a young specimen, yet it has flowers and fruits. The pilose character on number 5216, the type for the genus and species, is not a character of our specimens.

WENDLANDIA Bartl.

Wendlandia brachyantha Merr. in Philip. Journ. Sci. Suppl. I; 128, 1906.

The type is *H. N. Whitford* number 449 from mount Mariveles, collected in July, 1904. Its range seems to extend northward to the Batanes islands.

Wendlandia glabrata DC. Prod. IV; 411, 1830.

This species has heretofore been collected mostly in the subalpine regions of Luzon. My number 12345 from Sibuyan island is typical.

Wendlandia nervosa Merr. in Philip. Journ. Sci. III; 263, 1908.

Based upon a single specimen collected by *Maximo Ramos* in the province of Zambales, Luzon, in 1907. Number 5007, Bureau of Science.

DOLICHOLOBIUM Gray

Dolicholobium philippinense Trelease * n. sp.

Rusty villous. Leaves elliptical, acuminate, subacute at base, 6 x 12-13 cm., minutely revolute, becoming glabrous above but with persistent long rusty hairs along the midrid—and to a lesser extent the veins and margin—beneath. Petioles about 15 mm. long. Flowers 5-merous. Corolla (in the sterile form) slender, with narrow lobes (2-3 x 10 mm.) nearly equalling the tube. Capsule 2-3 x 12 mm., crowned by the broadly funnel-shaped accrescent calyx parted to the middle with rounded subacuminate lobes 2 mm. long and wide. Seeds 0.5 x 1 mm., with a narrowly oblong attenuated wing 3 mm. long at each end.

Philippines, Sibuyan Island, Magallanes (*Elmer*, 12252, April, 1910.) An undershrub on shale rocky soil of wet or seepage banks or upon deeply shaded cliffs near water falls.

Closely allied to the Fijian *D. latifolium* and *D. longissimum*, the former of which has broadly obovate round-based leaves; and the latter elliptical leaves not acuminately pointed, larger flowers with broad corolla lobes (6 x 10 mm.) about half as long as the tube, and larger fruit (5 x 16 mm.) with minutely toothed calyx.

This is the ninth species in the genus and the only one thus far known from the Philippines. Five are reported from Fiji, two from New Guinae and one from Solomon island.

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* Not having the necessary literature for specific determination, a small specimen was sent to *Dr. William Trelease*, Director of the Missouri Botanical Garden, who was kind enough to determine and diagnose it.

UNCARIA Schreb.

Uncaria velutina Hav. in Journ. Linn. Soc. XXX; 84, 1897. *Nauclea clavisepala Merr.* in Philip. Journ. Sci. III; 266, 1908. *Uncaria clavisepala Elm.* Leaf. Philip. Bot. I; 350, 1908.

A rare species, and has only been collected by *Cuming*, *Vidal* and by myself.

Uncaria nervosa Elm. n. sp.

Scandent upon large trees; branches all along, rigid, slender, green, angular, descending or drooping, the stem 2.5 cm. thick, smooth. Leaves horizontally spreading, flat or only the short abruptly acute tips recurved, shining dark green on the upper glabrous surface, much lighter on the more or less pubescent under surface, base rounded, elliptish oblong, margins entire, 12 or more cm. long, 7 or more cm. wide across the middle; petioles stout, curved upwardly, glabrous, 1 cm. long; stipules nearly 1.5 cm. long, submembranous, brown, broad, obtusely rounded, caducous; nerves very prominent beneath, sunken on the upper side, 9 to 12 pairs, oblique, subparallel, tips curved and only obscurely united, cross bars numerous, relatively prominent, all covered with dirty brown hairs. Flowers not seen; peduncles 5 cm. long, the upper portion brown pulverulent, bracteate at the middle or a trifle above this, the basal portion very stout, flattened, smooth and transformed into a hook; the small receptacle brown hairy; pedicels slender, 1.5 cm. long, soft ferruginous pubescent; capsule equalling the pedicels in length, fusiform, 2-celled, brown pubescent, longitudinally striate, terete, nearly 4 mm. thick across the middle; seeds numerous, light brown, elongately lenticular, each end with a 3 mm. long hyaline tail, one of which is nearly parted into 2, the other is entire and linear.

Type specimen 11794, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September, 1909.

Scandent with other vines along a large tree trunk up to its lower limbs, in a fertile densely humid and thickly

forested flat at 4000 feet, south of the Baruring river. "Colilo" is the Bagobo name.

COPTOSAPELTA Korth.

Coptosapelta flavescens Korth. in Ned. Kruidk. Arch. II; 113, 1851. *Randia olaciformis Merr.* in Philip. Journ. Sci. III; 163, 1908.

In our archipelago it is only known from lake Lanao, central Mindanao, through *Mrs. Clemen's* collection.

ADINA Salisb.

Adina garciae Elm. n. sp.

A medium-sized tree; stem 15 cm. thick, 10 or more m. high; branches above the middle, forming an elongated crown, the ultimate ones rather numerous; wood moderately hard and brittle, dingy white except the deep yellow central portion, tasteless as well as odorless; bark whitish beneath the brown epidermis, covered with grayish usually horizontally arranged lenticels. Leaves thinly coriaceous, ascending and folded upon the upper side, slightly paler green beneath, tips recurved, the upper surface shining green even in the dry state, ample toward the ends of the twigs, the average blades 8 cm. long and 3 cm. wide, linearly oblong or broadly oblanceolate, with the widest portion across the middle or above this, apex acuminate, base cuneate to obtuse, entire, glabrous, arranged oppositely; petioles 1 to 2 cm. long, glabrous; nerves about 7 pairs, quite prominent, the fine reticulations obscure; stipules caducous. Flowers not seen; infrutescence erect, arising from the uppermost leaf axils, usually solitary; peduncle strict, as long as 5 cm., minutely bracteate above the middle, toward the apex finely yellowish brown puberulent; head globose, 12 mm. in diameter; receptacle one third as thick, densely provided with short fimbriate scales; fruit composed of 2 halves and splitting into 4 carpels, angularly obovoid, 4 mm. long, 3 mm. wide above the middle, freely separating, the flattened apex at

least densely yellowish brown pulverulent, the ovary disk 1.5 mm. across, without vestiges of the calyx rim, the light straw colored central axis persistent and bearing equally persistent ovately triangular and pendulous placentae; seeds flat, brown, reticulate, 0.5 mm. wide, the broader end finely fimbriate, the other end acute.

Type specimen 12051, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, March, 1910.

A small tree only once or twice observed in compact red soil of the wooded hills at 500 feet. Called "Dunpilan" by the Visayan on Sibuyan island. This identical species is matched in the herbarium, Bureau of Science, by a single specimen collected eight years ago by *Garcia* at Dalupaon, Camarines Sur, Luzon. His ticket bears number 21 and the vernacular name is given as "Dagat-laya." Named after the first discoverer, *Sr. S. Garcia.*

Mr. Merrill assures me that *Garcia's* specimen quite agrees with *Haviland's* type of *A. multifolia;* yet the leaves in our specimens are twice as large, not ovate, with much longer petioles. We have other specimens which come nearer to *Haviland's* description.

Adina zschokkei Elm. n. sp.

Small tree; stem 15 cm. thick, 5 m. high, branched from below the middle; branches copiously rebranched, the twigs suberect; wood heavy, burly, moderately hard, bitter, odorless, sappy white; bark brown, scaling on the stem, smooth and grayish on the branches, reddish brown beneath the epidermis. Leaves mainly horizontally spreading, thinly coriaceous, deep green on the upper folded surface, much paler green beneath, greatly varying in size, lanceolate, glabrous, entire, slenderly acuminate and usually somewhat curved at the apex, alternate and frequently inequilateral at the base, drying green, the larger ones 2 dm. long, nearly 5 cm. wide across the middle or just below it; petioles glabrous, 1 cm. long; veins prominent beneath, brown, 7 to 9 pairs, ascending, much curved toward their ends, reticulations very faint; stipules deciduous, broadly oblong, gla-

brous, apex obtuse. Inflorescence a 1 dm. long terminal panicle, occasionally with 2 lateral peduncles, erect, the younger stalks brown pulverulent, the branchlets verticellately arranged and subtended by bracts; heads globose, 2 cm. across in the dry pressed out state, upon 1 to 1.5 cm. long strict peduncles or rather pedicels, short yellowish brown pubescent, usually bracteate a trifle below the middle; calyx turbinate, 2.5 mm. long, the upper one half divided usually into 5 oblong roundly pointed segments, glabrous, occasionally subtended by linear segments; corolla 5 mm. long, gradually tapering from the base, glabrous, creamy white, the upper one third usually divided into 4 ovately oblong segments which are valvate in the bud; stamens also 4, alternating with the segments; filaments filiform, glabrous, crinked, 0.75 mm. long, inserted a trifle below the throat; anthers as long, ovoidly elliptish, minutely mucronate at apex, basifixed; style 10 mm. long, glabrous, bearing a clavate stigma; fruit unknown.

Type specimen 12176, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

Inhabiting moist fertile soil of a lightly wooded and jungled lime-stone hillside near the coast. The odorless flowers form dense whitish masses. Named after my esteemed friend, *Theo. C. Zschokke.*

From description it does not agree with any of *Haviland's* varieties under *A. polycephala* (*Wall.*) *Benth.*

Nauclea forsterii Seem. Fl. Vit. 121.

Cuming collected this in the province of Albay. His number is 878.

Nauclea gracilis Vid. Phan. Cuming. Philip. 176, 1885.

The following is my field-note to number 10847 from Todaya:—A strict and slender tree on steep wooded slopes of the Baruring river at 3000 feet; stem 3 dm. thick, terete, 10 to 15 m. high; wood hard, heavy, brownish toward the center, slightly fetid; old bark scaling in plates; branches above the middle, smooth, lax, numerously branched, grayish

brown, the ultimate ones suberect, forming an elongated loosely spreading crown. Leaves thinly coriaceous, the old ones very deep green on the upper side, yellowish so beneath, strongly recurved, the young ones light green. Inflorescence mostly solitary, erect, the stalks yellowish green, the flowering heads globose, nearly 2 cm. across, creamy white, rather soft, with a faint unpleasant odor. The Bagobo vernacular name is "Mabalod."

Heretofore only known from the island of Mindoro and from Albay province, Luzon.

Nauclea jagori Merr. in Philip. Journ. Sci. III; 326,1909.

The type is based on *F. Jagor's* number 987 from the island of Samar.

Nauclea philippinensis (Vid.) Hav. in Journ. Linn. Soc. XXIII; 52, 1897. *Adina philippinensis Vid.* Fl. Vacs. Pl. Philip. 148, 1886.

Number 11220 *Elmer* from Todaya has the following field-note:—Tree 12 m. high, with a 3 dm. thick trunk, on a wooded summit ridge at 4000 feet; branches mostly at the top, forming a rather flat crown; branchlets very numerous, ascending, flexible even though short. Leaves rigidly coriaceous, dark dull green above, much paler or even yellowish green beneath, ascending, slightly recurved, shallowly conduplicate. Infrutescence erect, the terete peduncles green and turning red with age or with exposure. The Bagobo name is "Mabalod-tapang-pang."

This and *N. gracilis Vid.* distributed under my number 10847 were collected within a mile of each other, but under different local conditions. The two are very closely allied, yet distinguishable in the field as well as in the herbarium. Previously known from Luzon only.

Nauclea formicaria Elm. n. sp.

A burly tree; stem 3 dm. thick, 8 m. high; branches arising from below the middle, crookedly rebranched, rigid, spreading; wood dirty yellowish white, heavy, burly, odorless,

with a bitter taste; bark yellowish gray, thick, red beneath the epidermis, scaling in plates; the twigs enlarged beneath the foliage, glabrous. Leaves thinly coriaceous, spreading light green above, yellowish so beneath, oval or broadly elliptic, opposite, usually with 2 to 3 pairs toward the ends of the twigs, 2.5 dm. long, 1.5 dm. wide, entire margins thin, rounded at the apex, truncately so at the base, drying much paler green beneath, glabrous; petiole 1 to 2 dm. long or longer, glabrous, stout; bud bracts or stipules 2 cm. long, 1 cm. wide, deep brown in the dry state, obtusely rounded at the apex; nerves 8 to 11 on each side of the prominent midvein, oblique, strict, brown and glabrous, only obscurely united at their tips, reticulations very fine. Inflorescence globose, terminal, upon a 1 dm. long green usually solitary peduncle, 7.5 cm. in diameter; calyx tube 4 mm. long, angular, subglabrous; the 5 segments 6 mm. long and extended into thick clavate tips usually longitudinally ridged and yellowish brown pulverulent; corolla glabrous, 1.5 cm. long, gradually widening from the base, the apex obscurely lobed and more or less fimbriate; stamens 5, included; filaments 0.75 mm. long, glabrous; anthers 3 mm. long, linear, basifixed, 2-lobed at the base; style also glabrous, exceeding the corolla, bearing the clavate stigma; fruiting head greenish, solid, 3.5 cm. across, globose; cocci 12 mm. long, 3 mm. thick, angular, free, the thick 3 mm. long apical portion easily detached; seeds numerous, light brown, lenticular, each end with a 2 mm. long hyaline wing.

Type specimen 11034, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, June, 1909.

Inhabiting shrubberies of gulches in the cogon region at 1000 feet. The Bagobos call it "Mabalod." Nearly all the twigs on the tree were teretely swollen 3 to 7 cm. long and 1 cm. thick. These cylindrical portions were punctured and inhabited by small black ants.

SARCOCEPHALUS Afzel.

Sarcocephalus horsfieldii Miq. Fl. Ind. Bat. II; 134, 1853.

The following is taken from the field-note of the flowering

specimens of my Todaya number 10886:—Tree, 13 m. high, 4.5 dm. thick; wood moderately soft, yellowish brown, thinly checked; branches from above the middle, forming an elongated crown, the branchlets widely spreading, lax and some even drooping. Leaves similarly green on both sides, nearly flat or only the tips recurved, submembranous. Inflorescence upon 3 cm. long green peduncles, axillary or terminal, mostly descending; buds green; flowering heads globose, 3 cm. in diameter; pistil creamy white, the corolla creamy yellow or greenish white; calyx green. A fine tree in dense forests of moist fertile soil south of the Baruring river at 4000 feet. Known to the Bagobos as "Mamulocko."

MUSSAENDA Linn.

Mussaenda albiflora Merr. in Philip. Journ. Sci. V; 241, 1910.

The type is Forestry Bureau number 17358, collected by *Mr. Curran* last year on the island of Negros. There are several sheets in the herbarium, Bureau of Science, all from Negros.

Mussaenda grandifolia Elm. Leaf. Philip. Bot. I; 13, 1906.

This remarkable species has not been recollected. The leaves, color of pubescence and the branching of the inflorescence resemble that of *M. vidalii Elm.*, but the short persistent calyx segments are entirely different.

Mussaenda philippinensis Merr. in Philip. Journ. Sci. III; 264, 1908.

This is based on a single sheet, collected by the author on Semerara island in July, 1905.

I erroneously referred it under *M. anisophylla Vid.* when the first article of the Leaflets was written, although at that time I wrote a note on the sheet in regard to the long and apparently persistent calyx segments. *Merrill's* number is 4139.

Mussaenda lanata C. B. Rob. (in herbarium Bureau of Science).

This also was erroneously referred to *M. anisophylla Vid.* in my first article. Quite common in, but not known outside the province of Benguet. First collected by myself in April, 1904, and in November of the same year by *Mr. R. S. Williams.*

Mussaenda philippica Rich. in Mem. Soc. Hist. Nat. Par. V; 245, 1834. *M. grandiflora* (*Mey.*) *Rolfe* in Journ. Linn. Soc. XXI; 311, 1884, not *Bentham. Calycophyllum grandiflorum Mey.* Reise II; 234. *Merr.* in Philip. Journ. Sci. V; 242, 1910.

A sea-coast shrub, common on all the islands.

Mussaenda villosa Wall. Cat. n. 6254, 1832. *Merr.* in Philip. Journ. Sci. V; 243, 1910.

Mussaenda scandens Elm. n. sp.

A climber; stem 3 to 5 cm. thick, squarrish or quadrangularly angled; branches numerous, curved and interlaced, the free ends hanging and with suberect tips; wood whitish, soft, whithout odor or taste; bark smooth, yellowish, brown on the branches and spotted with lighter brown lenticels. Leaves opposite, scattered, the larger blades 12 cm. long, one half as much across the middle, frequently much smaller, ovately elliptic to broadly oblong, apex abruptly acute, base similarly cuneate, obtuse to subrotund, thinly coriaceous, slightly conduplicate on the upper subglabrous much darker green surface; tips recurved, entire, finely pubescent beneath on the nerves; petiole averaging 1 cm. long, ultimately subglabrous; nerves 7 to 10 on each side, quite evident beneath, ascendingly curved, reticulations fine; stipule deciduous, yellowish gray pubescent on the outer side, ovately acuminate, nearly 1 cm. long. Inflorescent branchlets suberect, 5 cm. long or longer, corymbosely branched above the middle, all the stalks dirty strigose; bracts acuminate, similarly pubescent, caducous; flowers upon short strigose pedicels; calyx elongated ellipsoid, pubescent, 4 mm. long; segments 5, ra-

ther thick, sharply acuminate, 4 mm. long, 1.5 mm. wide at the base, the outer ones occasionally developed into petaloid appendages, recurved, strigose; corolla 2 cm. long at least, tubular and strigulose on the outside including the segments, yellowish hairy on the inside from below the middle to the throat; lobes 4 or 5, quite thick, ovately oblong, 3 cm. long, 1.5 mm. wide, nearly free; stamens 5, in the middle of the tube; filaments very short, glabrous; anthers narrowly linear, nearly 4 mm. long, attached below the middle on the back; style slender, glabrous, terminated by 2 flattened stigmatic arms; fruit short ellipsoid, 12.5 mm. long, 2-celled, smooth; seeds very many, light brown, subcompressed, pitted, 0.75 mm. across, angularly circular from the side.

Type specimen 11291, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, August, 1909.

This lofty tree climber was collected in a densely wooded ravine of good soil along the Baracatan creek at 2750 feet.

Appearing somewhat like specimens of *M. philippica Rich.*, but aside from having an entirely different habitat it differs in many minor details.

Mussaenda vidalii Elm. n. sp.

Scandent with other climbing vines along a large tree trunk to its first limbs; stem branched all along, 3 to 5 cm. thick, subterete; branches lax, somewhat drooping and with suberect tips; wood soft, whitish, odorless and tasteless; bark smooth, yellowish gray, lenticelled and ferruginous pubescent on the twigs. Leaves well separated along the branchlets, opposite, membranous, much deeper green above, drying brown on the upper strigulose surface, pale green on the lower pubescent side, entire, flat, mainly horizontal, the larger blades 20 mm. long, 12 mm. wide, elliptic or the smaller ones ovately elliptic, apex abruptly acute, base broadly obtuse, short cuneate or rounded; nerves 7 to 9 on each side, ascendingly curved especially toward the tips, fuliginous hairy on the upper side of the blade as well as beneath, cross bars evident, the reticulations minute; petiole

similarly strigose, varying up to 5 cm. in length; stipules deciduous, acuminate, 1 cm. long, rusty brown pubescent. Inflorescence 1 dm. long, nearly as wide, dichotomously paniculate, fuliginous pubescent; the deciduous bracts densely pubescent, linearly acuminate, 5 mm. long or longer; pedicels and short stipitate flowers easily becoming detached; calyx 5 mm. long, oblong in outline, bristly deep rusty brown pubescent; the 5 segments nearly as long, 1.5 mm. wide at the base, gradually tapering to the acuminate point, rather thick, with similarly colored hairs, deciduous, occasionally with an outer large attractive segment; corolla tube yellowish green, curved, 2 cm. long, gradually tapering from base to apex, the upper portion densely hairy; lobes 5, oval to elliptic, densely pubescent on the outside, the upper orange red side pulverulent, united below the middle, apex broadly rounded, quite thick; style slender, glabrous; stigma entire, linearly acute, flattened, puberulent; stamens 5, inserted upon the middle of the tube which is pilose in the stamineal region; filaments 0.5 mm. long, flat, glabrous, adnate to the corolla; anthers 6 mm. long, narrowly linear, attached on the back below the middle; fruit ellipsoid, nearly 2 cm. long, apex rounded, more tapering at the base, 2-celled; seeds numerous, pitted, slightly compressed, rounded from the side view and with an evident pointed angle, brown.

Type specimen 11309, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, August, 1909.

Collected this scandent *Mussaenda* in a humid forested flat at 3750 feet. The suberect reddish brown inflorescence coupled with the broad membranous slightly descending leaves gave the shrub a unique appearance. "Botay" is the vernacular Bagobo name. Named after the celebrated botanist, *Soler y Vidal*.

It cannot be referred to either *M. anisophylla Vid.* nor to *M. grandifolia Elm.*

Mussaenda nervosa Elm. n. sp.

A shrub; stems several, 3 m. high, numerously branched, the branchlets erect, with young portion of the twigs dirty brown pilose; wood soft, greenish, odorless and tasteless; bark gray, with small flat lenticels beneath the skin.

Leaves ample, subcharteceous, ascending with recurved tips, rugose on the upper glabrous surface, paler green beneath, 1.5 dm. long, 5 cm. wide a trifle below the middle but frequently much smaller, elliptic, ovately oblong or occasionally the smaller ones broadest above the middle, opposite, crowded toward the end of the branchlets, base obtuse to cuneate, apex acute to acuminate, entire; petioles dirty pubescent, less than 1 cm. long; nerves sunken on the upper side of the blade, bold on the lower, parallel, ascendingly curved, 12 to 15 pairs, cross bars also prominent, all short dirty pubescent; stipule slenderly acuminate, 7.5 mm long, similarly pubescent, deciduous. Inflorescence erect, terminal, 1 to 1.5 cm. long, cymosely paniculate, nearly as wide across the top; bracts setosely acuminate, nearly 1 cm. long; flowers stipitate, not clustered; calyx elongated ellipsoid, 4 mm. long, 2.5 mm. thick, pubescent; segments 12 mm. long, linear, 1 mm. wide, coming to a fine point and with a prominent midvein, yellowish gray strigose along the edges and on the midvein on the dorsal side, occasionally a segment of the outer flowers petaloid, deciduous; corolla tube 3 cm. long, usually subfalcate, yellowish gray sericeous, slightly thickened above the middle; segments 5, ovately oblong to elliptic acuminate, free to the base, granular and deep yellow above, much paler yellow and pubescent beneath especially along the 3 parallel nerves, 12 mm. long, 5 mm. wide; stamens 5, inserted upon the middle portion of the corolla tube which is pilose on the inside above the middle; filaments flattened, glabrous, 1 mm. long and free, otherwise adnate to the tube; anther linear, 7.5 mm. long, attached on the back below the middle, base acute and bifid; style glabrous, slender, bearing a forked stigma; fruit at least 1 cm. long, ellipsoid, hairy in the young state, marked with grayish white lenticels, 2-celled; seeds very numerous, angularly globose, 0.5 mm. thick, light brown, pitted.

Type specimen 10510, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, May, 1909.

This rather dense shrub was discovered in light shrubberies on Angat's knoll at 4000 feet, in fertile soil, where the trail enters the densely forested basin of mount Apo. Called

by the Bagobos "Buyan." Remarkable in its numerous stout nerves, laciniate calyx segments and sericeous corolla.

Far from, yet nearest to *M. philippinensis Merr.* of our Philippine species.

Mussaenda magallanensis Elm. n. sp.

Lax shrub; stem 3 to 5 cm. thick, 4 m. high; branches arising from below the middle, widely spreading, laxly rebranched; the twigs terete, green and yellowish brown, pilose; wood very soft, whitish, odorless and tasteless, with a large snow white pith; bark yellowish, green beneath the epidermis, only obscurely lenticelled. Leaves soft membranous, lucid green above, much paler beneath, curved upon the upper side in hot days, otherwise flat, mostly horizontal, opposite, scattering along the branchlets, the larger ones 2.5 dm. long, 1 dm. wide across the middle, quite variable in size, mostly elliptic, the smaller ones oblong, entire, abruptly acuminate at the apex, base cuneate to obtuse, drying green, both sides with dirty white or brownish hairs especially the lower surface in the young state; petiole brown pilose, usually under 3 cm. in length; lateral veins pinnate, 15 to 18 on each side, subparallel, little curved, quite conspicuous beneath, connected by faint cross bars; stipules soft, dry, brown and densely hairy, subpersistent, entire or few laciniate, acuminate from a broad base, 12.5 mm. long. Inflorescence terminal, corymbosely paniculate, 1.5 dm. long, nearly as wide, all the stalks pale to reddish brown pilose; bracts similarly pilose, nearly 15 mm. long, lanceolate with laciniate tips; flowers in small clusters, the central terminal one stipitate, subtended by involucral bracts; calyx elongated elliptic, 3 cm. long without the segments, 2 mm. thick, covered with hyaline septate hairs; segments 5, the outer ones occasionally developed into large white slenderly stalked show appendages, similarly hairy, linear, 6 mm. long, 1 mm. wide at the base, gradually tapering to the fine point, 3-striate toward the base, deciduous; corolla tube 3 cm. long, slightly inflated above the middle and pilose on the inner side, glabrous or with only straggling hairs, the valvate bud enlarged, suberect, pale yellow; lobes 4, rotate, 5 mm. long, broadly elliptic, united up to the

middle, deep red or nearly orange color on the upper pulverulent surface, lighter yellow on the lower side and with 3 parallel veins, apex rounded or apiculate; stamens 5, attached to the middle of the tube; filaments 1 mm. long, adnate to the corolla tube, glabrous; anthers linear, 5 mm. long, bifid at the base, attached on the back below the middle; style filiform, glabrous, 2-lobed; fruit greenish brown, 2 cm. long, ellipsoid or the base more tapering, pilose in the younger state, with grayish white excrescences, 2-celled; seeds at least 0.5 mm. thick, subglobose, pitted, dark brown, very numerous.

Type specimen 12451, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910.

Not rare in the shrubberies or light woods along the coast and in the foothills. A handsome shrub and is known to the Visayan as "Agboy."

Differentiated from *M. anisophylla Vid.* by the different calyx segments and glabrous corolla tube, combined with other characters.

LUCINAEA DC.

Lucinaea monocephala Merr. in Philip. Journ. Sci. V; 241, 1910.

Based on Bureau of Science number 10034, collected by *Maximo Ramos* near Dahican, province of La Laguna, Luzon.

Lucinaea involucrata Elm. n. sp.

Scandent shrub; stems numerously branched all along, 1 cm. thick, terete, bendable; branchlets numerous and forming a dense tangled mass about its support; the glabrous and greenish twigs curvingly erect. Leaves thickly coriaceous, quite brittle when old, ascending, nearly flat, shining dark green on the upper surface which turns nearly black while drying, much paler green beneath and becoming brown in the dry state, oblong or elliptish, the average or larger blades 7.5 cm. long, 3 cm. wide across the middle or just above this, the entire margins involute in the dry state, apex obtuse to acute, base acute to subcuneate, gla-

brous, the lower side sprinkled with minute black spots-opposite and more or less scattering along the short branch, lets; petiole brown, glabrous, 1 to 1.5 cm. long; midvein prominent, brown, with 5 to 7 lateral rather obscure pairs; stipule subpersistent, brown, dry, 7.5 mm. long or shorter, broadly obtuse at apex, widest above the middle. Inflorescence usually solitary and terminal; peduncles green, erect, 1.5 cm. long, subtended by foliaceous bracts; head 1.5 cm. across, several-flowered, subtended by a broad cup-shaped entire and glabrous involucre 5 mm. deep; receptacle glabrous; calyx thick, obovoidly ellipsoid, also glabrous, more or less angular, with a truncate rim; corolla 8 mm. long, correspondingly thick and rigid, creamy white, glabrous except the hairy throat; segments 4, one half as long as the entire length, oblong, obtuse at apex; stamens 4, inserted on the throat; filaments 0.75 mm. long, flattened, glabrous; anthers oblong, 1.5 mm. long, dorsifixed; style barely as long as the corolla, smooth except the pulverulent upper side of the 2 recurved stigmatic lobes; fruit apparently 1-celled; seeds numerous, inbedded in a juicy meat, brown, finely pitted, compressed, irregularly angular from the side view, nearly 1 mm. across.

Type specimen 11227, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, July, 1909.

A numerously branched tree-trunk climber on a wind swept wooded ridge of mount Burebid at 3750 feet.

Despite the flowering heads being involucrate, I place it in *Lucinaea*, and our species is related to *L. ridleyi King*.

UROPHYLLUM Wall.

Urophyllum elliptifolium Merr. in Philip. Journ. Sci- V; 247, 1910.

Collected by *H. M. Curran* on mount Pulgar, Palawan, and bears Foresty Bureau number 3871.

Urophyllum negrosense Merr. in Philip. Journ. Sci. V; 248, 1910.

The type in Forestry Bureau number 5550, collected by the late *H. D. Everett* along the Himugaan river, Negros.

Urophyllum platyphyllum Elm. n. sp.

Shrubby; stem 3 to 5 cm. thick, 4 m. high, terete, widely branched from below the middle; branchlets green, usually appressed hairy and slenderly rebranched; wood greenish white, very soft, with an extra large pith, odorless and tasteless. Leaves membranous, descending, much paler green beneath, shallowly concave above, tips abruptly recurved and short acute, base obtuse or subtruncate, drying green, glabrous except the nerves, margins entire, the larger blades 2.5 dm. long, 12 cm. wide across the middle or a trifle above it, broadly oblong or narrowly elliptic, usually widest just above the midle; petiole 1 to 2 cm. long, cinereous, green: nerves 14 to 16 on each side of the prominently raised midvein, green even in the dry state, ascending, strict, parallel, tips ascendingly arched, finely strigose on both sides, reticulations and crossbars fine yet evident; stipules, also greenish, elongated lanceolate, 1.5 cm. long, tips brownish. Infrutescence in dense sessile clusters arising a few mm. above the leaf axils; pedicels slender, pale green, 1 to 2 cm. long, straight, pubescent, all arising from a short minutely bracteate common stalk; young fruit globose, 5 mm. thick, the younger ones pubescent, greenish, crowned by the 4 short calyx teeth, 5-celled; seeds many, imbedded in a pulpy mass, light straw color, subglobose, less than 0.5 mm. across.

Type specimen 12363, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

This shrub was only once seen in a moist gravelly soil overgrown with herbaceous and suffrutescent thickets in a small wooded gully at 1750 feet, on the trail toward España. Its large bright green leaves make a pretty appearance!

This, I believe, can be referred under the *U. glabrum Wall.* group.

Urophyllum reticulatum Elm. n. sp.

Erect shrub; stem 5 to 8 cm. thick, terete, rather crooked, 3 m. high or higher; branches crookedly rebranched toward the top or from near the middle; wood soft or hard and rigid, dingy white, odorless, slightly bitter; bark thick,

yellowish gray, longitudinally checked, the rigid branchlets smooth and green. Leaves mainly horizontal, flat, apex recurved, deep shining green above, beneath much paler, rigidly chartaceous, glabrous, acute to cuneate at base, terminated by a short abruptly acute point, entire margins somewhat thickened, drying green, oblong, the normal ones 12 cm. long, by 5 cm. wide across the middle; veins conspicuous beneath, the midvein very prominent and yellowish brown, the main lateral ones 7 to 9 on each side, ascendingly curved and reticulately united, reticulations numerous and conspicuous; petiole glabrous, obscurely angular, 2 to 4 cm. long; stipules thick or nearly plated, glabrous, ovately triangular, 5 mm. long, very dark green. Peduncles ascending, usually solitary from the lowermost leaf axils, glabrous, 7.5 mm. long or less, bearing 3 flowers; pedicels less than 5 mm. long, subtended by short ovate bracts; calyx smooth, subglobose, 5 mm. across, green, truncate; corolla thick and fleshy, creamy white, with a 2 mm. long tube; segments 6, curvingly reflexed, 5 mm. long, 2 mm. wide, tapering to an acuminate point; throat densly villous, 1 mm. long; anthers as long, basifixed, ellipsoid, with an apiculate apex; style very short, tumid, glabrous; stigma short clavate, 3-lobed; young fruits shining deep red, several-celled, with numerous minute ovules.

Type specimen 12506, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910.

This shrub-like tree was discovered in stony moist soil of a forested ridge at 4000 feet. The inflorescence, young portions of the twigs and young leaves turn to a dark red color while drying.

It also falls in with *U. glabrum Wall.*, but is very distinct from any of the forms under that widely known species.

WILLIAMSIA Merr.

Williamsia sablanensis (Elm.) Merr. in Philip. Journ. Sci. I; 39, 1906. *Urophyllum sablanense Elm.* Leaf. Philip. Bot. I; 39, 1906.

Quite common in middle and northern Luzon; more recently several specimens were collected by *Mrs. Clemens* in the Lake Lanao region of Mindanao, besides a specimen from Zamboanga by each of *Copeland* and *Williams*.

ADENOSACME Wall.

Adenosacme apoensis Elm. n. sp.

Lax shrub, 1 to 2 m. high; stem 7.5 mm. thick, easily breaking and covered with a smooth yellowish gray bark; branches sparingly rebranched, reclinate. Leaves thin, much paler green beneath, mainly horizontal, flat or only the tips recurved, opposite, glabrous or the larger veins beneath dirty brown scurfy, membranous or thinly chartaceous, drying green, broadly and more or less oblanceolate, entire margins, the average blade 2 dm. long and 5 cm. wide just above the middle, apex acuminate, base attenuate; nerves conspicuous beneath, 9 to 12 on each side of the prominent midvein, the reticulate cross bars quite evident; petiole slender, subglabrous or minutely scurfy brown, averaging 2.5 cm. in length; stipule submembranous and subglabrous, 7.5 mm. long, entire, brown when dry, triangularly acuminate. Inflorecence a loose cymose panicle, descending, usually in the leaf axils, once or twice branches, 5 cm. long and about as broad; peduncle subcompressed, dirty brown scurfy, arising from a whorl of persistent dry straw-colored bracts and bearing 1 or 2 similar whorls; pedicels similar in vestiture, very slender, subtended by similar bracts, chiefly in whorls of 3's, the larger ones occasionally branched, most of them 2 cm. long; calyx 7 mm. long, elliptic, the base much constricted, rough puberulent or finely scabrous, abruptly divided into 5 setose 3.5 mm. long segments; corolla bright yellow, 12 mm. long, tubular, glabrous except the strigose hairs in the middle portion of the more or less narrowed tube; lobes 5 triangularly oblong, valvate; stamens 5, just below the throat; filament glabrous, 0.5 mm. long, adnate to the corolla; anthers oblong, 2 mm. long, dorsifixed, acute at apex; style slightly exceeding the corolla 2-forked at apex although occasionally easily separating clear to the narrowed

base, glabrous toward the base, short tomentose otherwise; fruit subglobose, 5 mm. thick, at best twice as thick when fresh, slightly scabrous, 2-celled, juicy, snow-berry white, surmounted by the persistent calyx teeth; seeds 0.5 mm. across, dark brown, angularly flattened, very numerous in 2 dense masses.

Type specimen 10504, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, May, 1909.

A low undershrub in humus covered fertile soil in very moist densely forested flats at 4000 feet. Nowhere common and individual plants widely spreading. Apparently this same species has also been collected on Mindoro by *M. L. Merritt*, numbers 11470 and 12076 of the Forestry Bureau series. Called by the Bagobos "Tabiscas-sering."

Very distinct from *King* and *Gamble's A. sortechinii* from Perak. Also related to *A. cauliflora* (*Reinw.*) *Miq.* from Java.

Adenosacme mindanaensis Elm. n. sp.

Suffrutescent; old stems as thick as an ordinary lead pencil, terete, less than 1 m. long, yellowish or straw brown, sparingly branched, reclining over the steep slopes, the tips suberect. Leaves flat, spreading and descending, membranous, deep green above, grayish beneath, diverse in size, the larger blades 2.5 cm. long by 1 cm. wide across the middle, sharply acuminate and occasionally subfalcate at the apex, cuneate and slightly inequilateral at the base, margins entire, elliptish oblong, strigose on both sides, especially beneath; main lateral veins 11 to 13 on each side, faint, well arched and submarginally united, short brown pubescent, reticulations fine yet evident; petioles 5 cm. long but much shorter in the smaller leaves, usually provided with dirty brown short crisp hairs; stipule submembranous, oblong, obtuse, 1 cm. long. Inflorescence terminal, deflexed, 5 cm. long, umbellately branched above the middle, arising from a pair of stipules; peduncle provided with brown crisp hairs, 2 or 3-umbellately branched; flowers in small subsessile glomerules of from 3 to 5, subtended by an irregularly lobed involucre bearing upon the upper side many clavate and distinctly stalked appendages, otherwise glabrous; pedicels 1 mm. long or less, provided with transparent trichome-

like hairs; calyx 4 mm. long, suburceolate, subglabrous, the upper one third divided into 5 obtuse segments, the margins of which occasionally bear some clavate appendages; corolla conical, with strigose hairs at the apex, inflated at the base, separating into 5 segments nearly to the base, yellowish green; segments thick, light yellow, valvate, 2.5 mm. long or longer, triangularly acute to acuminate, the terminal portions reflexed; stamens 5, inserted upon the corolla near the base; anther 1 mm. long, broadly linear, ends rounded or shallowly bilobed at the base; filament less than 0.5 mm. long, flattened, glabrous, attached to the back of the anther toward the base; ovary with a flattened rim; styles glabrous, yellowish green, 0.75 mm. long, free or slightly united toward the base, bearing terminal small stigmas; pedicels of the fruits 5 mm. long; fruits 5 mm. thick in the dry state, twice as large when fresh, globose, watery, snow-berry white, apex sunken and bearing the persistent reflexed calyx teeth, apparently 2-celled, with 2 clusters of numerous seeds; seeds nearly black, angular, pitted, 0.33 mm. across.

Type specimen 10831, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, June, 1909.

A spreading suffrustescent more or less succulent plant inhabiting very wet densely shaded ravine slopes or on seepage ledges along the Sibulan river at 3250 feet. "Tabis" is the Bagobo name.

This same species the writer collected a few years ago in southern Negros, and was distributed under *A. longifolia Wall.* But it differs from that species in having stipules twice as long, inflorescence smaller and with a different branching; fruits also much larger, not turbinate and entirely without the many vertical lines.

RANDIA Linn.

Randia pulcherrima Merr. in Philip. Journ. Sci. III; 164, 1908.

The type of this splendid species is 765 *Mrs. Clemens*, collected by her in 1906 in the lake Lanao region of central

Mindanao. Also known from mount Banahao. See *Elmer* 9127 from Lucban which is in fine fruit.

Randia whitfordii (Elm.) Merr. in Philip. Journ. Sci. Suppl. I; 130, 1906. *Gardenia whitfordii Elm.* Leaf. Philip. Bot. I; 4, 1906.

Common on mount Mariveles. In *Randia* the ovary is 2-celled and the cell partition in the fruit is very thin or nearly obsolete, while *Gardenia* is 1-celled in the ovary as well as in the fruit.

Randia wallichii Hook. Fl. Brit. Ind. III; 113, 1880.

Rather common, chiefly from Luzon. Previously referred by me to *R. fitzalani Muell. Arg.*

Randia ticaensis Merr. in Philip. Journ. Sci. V; 245, 1910.

The type specimen is Forestry Bureau number 12547, collected by *Rosenbluth* at Point Linadlaran, island of Ticao.

Randia stenophylla Merr. in Philip. Journ. Sci. V; 245, 1910.

Collected by *H. M. Curran* at Norzagaray, province of Bulacan, Luzon. Forestry Bureau number 7170.

Randia williamsii Elm. n. sp.

A looping climbing shrub; stem terete, 2 cm. thick, quite rigid, occasionally branched; branches slender, sparse and divaricate, the twigs suberect and green, the free parts drooping; wood not hard, greenish, odorless and tasteless, that portion about the large whitish pith yellow; bark dull brown, smooth. Leaves submembranous, horizontal, paler green beneath, flat, opposite, widely scattering, glabrous, drying blackish brown, elliptic to broadly oblong, 2 dm. long, 1 dm. wide across the middle or a trifle below it, margins entire, apex abruply acuminate, base rounded or obtuse; midvein prominent beneath, with 7 to 9 oblique lateral

pairs whose tips well arched and are united, the reticulations coarse and quite evident, all smooth and dark brown or nearly black; petiole 1 cm. long, brown, glabrous; stipule or bud bract 5 mm. long, broad at the base, setosely acuminate, deciduous. Flowers not seen; infrutescence terminal, rather short and quite rigid, green, 3 to 4 cm. long and about as broad, glabrous, branchlets and the 1 cm. long pedicels subtended by sharply acuminate subpersistent bracts; young fruit more or less pointedly ellipsoid, 1.25 cm. long, very dark green, much smaller in the dry state, apparently 2-celled by a thin partition, the exocarp thick.

Type specimen 12474, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910.

Scandent upon small trees in a rich densely forested flat at 750 feet.

Fairly well matched by *R. S. William's* number 2161 from Sax river, Zamboanga, February, 1905. Dedicated to *Mr. Williams*, of the New York botanical staff.

Randia arborea Elm. n. sp.

A very slender tree; stem 15 m. high, 3 dm. thick, terete, not perfectly straight; branches mostly toward the top, ascending; twigs smooth, brown, more or less angled with ascending tips, the young portion brown puberulent; wood soft, sappy white throughout, odorless but distinctly sweet; bark smooth, finely blotched with gray and yellow. Leaves membranous, lucid deep green above, yellowish green beneath with a very short pubescence especially along the nerves, the entire margins usually curved upon the lower side, opposite, more or less crowded toward the ends of the branchlets, the larger ones 2 cm. long, 8 cm. wide across the middle, abruptly acute at apex, base cuneate or obtuse; nerves pinnate, 13 to 15 on each side of the stout midvein, divaricate, with ascending tips which are articulately united, prominent, reticulations quite evident; stipules broad at the base, slenderly acuminate, 12 mm. long, pulverulent on the back; petiole 1.5 cm. long, at first short rusty brown pubescent, ultimately glabrate. Inflorescence corymbosely

paniculate, terminal, 5 cm. long, numerously flowered, branched from near the base, 5 to 8 cm. wide; branchlets dirty puberulent, subtended by sharply acuminate bracts; pedicels 3 to 4 mm. long, provided with few alternatingly bracteoles; calyx ellipsoid, 3 mm. long, nearly as wide, similarly pubescent, terminated by a rim of rather short rounded persistent lobes; corolla 9 mm. long at least, the tube nearly 5 mm. long, gradually enlarging from the base, pubescent on the outside; lobes 5, deflexed and usually twisted, creamy white, oblong, obtuse at apex; stamens 5, inserted upon the throat; glabrous filaments 0.5 mm. long, alternating with the segments; style as long or longer than the corolla, hairy at about the middle, slenderly clavate toward the tip; anthers linear, at least 3 mm. long, basifixed, forked at the base; fruits 7.5 mm. thick, globose, obscurely 2-celled; seeds about 15, light brown, irregularly triangular, 0.75 mm. across.

Type specimen 10978, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, June, 1909.

Discovered in well drained soil of a wooded ridge along the Baracatan creek at 1750 feet. Named by the Bagobos "Cayotgauli."

This probably should be referred under *Stylocoryne* rather than *Randia*. It seems to be related to *S. fragrans Blm.*

GARDENIA Linn.

Gardenia longiflora Vid. Fl. Vasc. Pl. Philip. 153, 1886.

The following is my field-note of number 12670 from Sibuyan island:—A shrub-like tree; stem 1 dm. thick, 5 m. high, branched above the middle; branches ascending, quite numerous, forming an elongated crown; wood sappy white, soft, odorless and tasteles; bark smoothish, yellowish gray. Leaves also ascending, conduplicate on the upper shining surface, paler green beneath, tips more or less recurved, subchartaceous. Flowers solitary, erect; calyx green, 2.5 cm. long; corolla tube cylindric, pale green, 1.5 dm. long, strict; the 10 segments 3 cm. long, oblique and rotately spreading, creamy white but soon turning to a very deep yellow; anthers of

the same number, brownish white; style white, bearing a thick clavate stigma, more or less 10-striate and of the same color as the sessile stamens, Fragrant flowers and shining leaves give it a very striking appearance! In fertile well drained soil of shrubberies bordering grass lands at 750 feet.

Very near if not identical to *G. glutinosa Zoll.*

VILLARIA Rolfe

Villaria littoralis Vid. Phan. Cuming. 180, 1885. *Gardenia elliptica Elm.* Leaf. Philip. Bot. I; 6, 1906.

Vidal's type is *Cuming* 874, from the province of Albay. In *Gardenia* the style is glabrous while in *Villaria* it is hairy. This is quite common, but the following species are rare.

Villaria acutifolia (Elm.) Merr. in Philip. Journ. Sci. V; 248, 1910. *Gardenia acutifolia Elm.* Leaf. Philip. Bot. I; 6, 1906.

Villaria rolfei Vid. Phan. Cuming. 180, 1885.

Cuming's collection, number 1271 from Albay province, is the type.

Villaria philippinensis Rolfe in Journ. Linn. Soc. XXI; 311, 1884.

Very little known.

DIPLOSPORA DC.

Diplospora fasciculiflora Elm. n. comb. *Randia fasciculiflora Elm.* Leaf. Philip. Bot. I; 31, 1906.

The range for this species is through middle Luzon as far north as Benguet province.

PETUNGA DC.

Petunga racemosa (Roxb.) K. Sch. in Nat. Pflanzenfamilien IV; 80, 1891.

Only known from the island of Balabac. *Vidal* first collected it there.

PLECTRONIA Linn.

Plectronia viridis Merr. in Philip. Journ. Sci. Suppl. I; 131, 1906.

The type specimen is 3945 of the author, collected on mount Mariveles, March, 1905. Widely distributed in the Philippines, but especially abundant in the type locality. *Elmer's* 12481 from the island of Sibuyan is not typical.

Plectronia megacarpa Merr. in Philip. Journ. Sci. III; 326, 1909.

Based upon Forestry Bureau number 8232, collected by *Messrs. Curran* and *Merritt* near Santa Cruz, province of Zambales, Luzon. Its large fruits are very characteristic, and is unknown elsewhere.

Plectronia gracilipes Elm. n. sp.

A small suberect tree; stem crooked, 1 dm. thick, 5 m. high, subterete; branches at the top mostly, divaricately spreading, numerously and laxly rebranched, forming a dense crown; the twigs somewhat drooping, curved, interlaced, tips suberect; wood brownish toward the center, moderately soft, odorless and tasteless; bark grayish white, more or less checked and roughened with excrescences. Leaves rigidly coriaceous, flat, ascending, shining deep green above, much paler or yellowish green beneath, drying nearly black on the upper side, brown beneath, diverse in size, glabrous, the smaller ones lanceolate to oblanceolate, the larger narrowly oblong, acuminately tapering at both ends, 1 dm. long, 2.5 cm. wide across the middle, the entire margins slightly involute in the dry state; midvein brown, smooth, the ascending lateral nerves 3 to 4 on each side, very obscure on both sides; petiole glabrous, 1 cm. long; stipule 4 mm. long, also glabrous, broad at the base, abruptly tapering to a sharp point. Inflorescence usually solitary, upon slender 3 long

smooth and axillary peduncles; pedicels umbellate, 1 cm. long; calyx glabrous, turbinate, 2 mm. long, sharply 4-dentate; corolla tube 1.5 mm. long, glabrous except the short woolly hairs at the throat, relatively thick; segments 4, reflexed, triangularly acute, 1.5 mm. long and nearly as wide at the base; stamens subsessilely inserted upon the throat, alternating with the segments; anthers 1 mm. long, ellipsoid or more tapering at the apex; style strict, 2 mm. long, glabrous, gradually tapering from base to apex; stigma globose, 0.75 mm. in diameter, fruits not seen.

Type specimen 12550, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910.

Collected in moist gravelly soil of the wooded banks of the Pauala river at 750 feet. The flowers are creamy white and odorless. Rare!

Related to *P. umbellata K. Sch.*

ANTIRRHOEA Comm.

Antirrhoea hirsutiuscula (T. et B.) Val. in Bul. du Departement de L'Agriculture XXVI; 2, 1909. *Timonius attenuatus Elm.* Leaf. Philip. Bot. I; 34, 1906.

Not since collected in the Philippines.

Antirrhoea benguetensis (Elm.) Val. l. c. page 8. *Timonius benguetensis Elm.* Leaf. Philip. Bot. I; 35, 1906.

Very similar to the following species and about as rare as the preceding.

Antirrhoea philippinensis (Benth.) Rolfe in Journ. Linn. Soc. XXI; 312, 1884. *Guettardella philippinensis Benth.* in *Hook.* Kew Journ. IV; 197, 1852.

TIMONIUS Rumph.

Timonius obovatus Elm. Leaf. Philip. Bot. I; 36, 1906.

Number 12359 *Elmer*, exactly matches the type speci-

men collected by *Garcia* at Baler, province of Principe, Luzon. This is the first time it has been recollected, and my field-note my prove instructive:—Medium-sized tree, in well drained shale rocky soil of woods at 1750 feet along the trail on the España side of the ridge. Stem 2.5 dm. thick, 12 m. high, more or less wadded, branched from the middle; branches divaricate, freely rebranched, quite rigid, the twigs ascending; wood heavy, hard, odorless, bitterish, dull or dingy white; bark yellowish, flaking in large thin plates. Leaves ascending or horizontal, nearly flat, paler green beneath, with yellowish green nerves; infrutescence ascendingly spreading, the branches yellowish green; mature fruits ovoidly globose, dark purplish red, nearly 7.5 mm. long, arranged along the lowerside of the branchlets, juicy; seeds 10 to 15, flattish, straw brown elongated, stone-like.

Timonius appendiculatus Merr. in Philip. Journ. Sci. III; 327, 1909.

The type is Bureau of Science number 2164, collected by *Maximo Ramos* at Antipolo, province of Rizal, Luzon. Besides the topotype it is also known from Mindoro. A fine distinct species.

Timonius philippinensis Merr. in Forestry Bureau Bulletin I; 54, 1903.

This species was discovered by *J. F. Quadras* in 1901 on the small island of Dinagat, off the northeastern coast of Mindanao. The collector's numbers are respectively 163 and 156. It has not yet been recollected.

Timonius quadrasii Elm. Leaf. Philip. Bot. I; 36, 196.

Neither has this species been rediscovered. In citing the type number it should have been 245 *J. F. Quadras* instead of 545.

Timonius macrophyllus Merr. in Philip. Journ. Sci. V; 246, 1910.

Collected by *Mr. Rosenbluth* near Catbalogan, Samar. Forestry Bureau number 12856.

Timonius epiphyticus Elm. n. sp.

Epiphytic; stem terete, several, 15 mm. thick, smooth and grayish; branchlets also slender, curved, 1 to 2 m. long, forming a loose hanging interlaced mass; wood soft and greenish, quite odorless. Leaves scattered along the branchlets, opposite, dark green above, much paler beneath, the sides shallowly convex on the upper side, tips slightly descending, otherwise flat, lucid on both sides, olivaceous in the dry state, the average blades 7.5 cm. long, 12 mm. wide toward the base, lanceolate, slenderly acuminate or subcaudate at the apex, base mostly obtuse, in the largest leaves rounded and in the smaller ones acute, rigidly coriaceous, the upper surface in the dry state sprinkled with minute whitish dots and covered with scattering white hairs, margins entire and involute, the lower surface with brown hairs especially along the nerves; midvein brown, very prominent beneath, sunken on the upper surface, olivaceous pubescent, the 3 to 5 lateral pairs faint, ascendingly curved; petioles 3 mm. long, densely covered with olive colored hairs as are also the young portion of the twigs; stipule nearly 15 mm. long, slenderly acuminate, brown, submembranous, deciduous, subtended at the base by tuftlets of yellowish brown persistent hairs, otherwise glabrous. Flowers solitary, upon slender olivaceous pubescent 1 to 2 cm. long usually recurved axillary pedicels; subtending bracts 2, acuminate, similarly pubescent along the median line, persistent; calyx ovoidly globose at the base, 4 mm. long, the apical 1.5 mm. narrowed into a 5-apicalate rim, more or less pubescent; the green corolla early falling, straight, 1 or more cm. long, pale creamy white, finely pubescent except at the subglabrous base, 1 mm. thick; segments valvate in the bud, 4, recurved, thickened at the tips; stamens 4, inserted upon the corolla tube near the base; filaments 0.5 mm. long, glabrous; anthers linear, 2 mm. long, attached dorsally below the middle; style fleshy, as long as the corolla, pilose, divided into 2 flattened stigmatic arms; ovary ovoid, 10 to 15-celled, glabrous, with numerous elongated purplish brown glands between it and the adnate calyx; ovules elongated and flattened, pendulous, nearly as many as there are cells; fruits nearly

7.5 mm. long including the persistent calyx rim, pubescent, costate, broadly columnar; seeds 12, parallel, subterete, 4 mm. long, 1.5 mm. thick, subbulbose at the base, apex sunken.

Type specimen 10706, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, May, 1909.

Upon the lower limbs of a *Meliaceous* tree at 3500 feet, in a humid forested george along the Baruring river, on the trail from Todaya to Talon. A fine species with its fine slender branchlets gracefully curved and pendant!

Timonius valetonii Elm. n. sp.

A small tree; stem 15 cm. thick, 5 m. high, branched from the middle; branches numerously rebranched, the twigs quite rigid and suberect; wood moderately soft, yellowish white, odorless, somewhat bitter; bark smoothish, gray and brown mottled, green beneath the epidermis. Leaves of several opposite pairs at the ends of the twigs, ascending, coriaceous, light green but somewhat paler beneath, flat or nearly so, apex recurved and short acute, elliptic, base obtuse or cuneate, glabrous above, minutely pubescent beneath in the young state, entire, 15 cm. long, one half of that across the middle, leaving large scars after falling; petiole less than 5 mm. long, olivaceously pubescent, ultimately glabrous; nerves similarly pubescent especially in the axils, 7 to 9 pairs on each side of the prominent midvein, ascending, parallel, strongly curved toward the ends, reticulations obscure; stipules caducous, bud scales 7.5 mm. long, pubescent and triangularly acuminate. Inflorescence of this plant not seen; fruit ovoidly globose, 1.5 cm. long, usually solitary from the lowermost leaf axils, upon 1 cm. long densely pubescent pedicels, subtended by a pair of similarly pubescent acuminate bracts, silky canescent, bearing a 3 mm. long apiculate calyx rim, smooth, not costate in the dry state; seeds elongated, about 40, arranged in 6 groups.

Type specimen 12342, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

An associate with the following species under the same ecological conditions and along the same river. A quite

handsome tree! Dedicated to *Dr. Th. Valeton* who recently published in the Bulletin du De'partement de L'Agriculture a review of the genus *Timonius.*

At the time of drawing up the diagnosis I discovered that it was unsafe to refer here the flowering specimens under number 12292—for the leaves are smaller on the whole, more tapering at the base, with fewer and more glabrous nerves. That number can more properly be referred to *T. arborea Elm.*, from which our new species here proposed differs entirely in the characters of the leaves and fruits. However, the foliage, young portion of the fulvous brown twigs and leaf scars on the older portion, petioles, caducous stipules, nerves with the sparse pubescence is quite the same as number 12120 with staminate inflorescence, and of which I attach the following description:—

Peduncle solitary in the leaf axils, fulvous brown, 2 cm. long, 2-branched at the top, the larger ones occasionally rebranched; flowers erect, scattered in 2 alternating rows along the upper side of the branchlets, the lower side subtended by an acuminate similarly pubescent bract; calyx densely fulvous, cup-shaped, 7.5 mm. long, 4 mm. thick, obscurely 4 to 5-denticulate; corolla tube 15 mm. long, gradually widening from the base, densely cinereous except at the apex where the hairs are yellowish; segments 5, strongly recurved, thick, one half as long as the tube, ligulate, obtuse at apex; stamens 5, alternating with the segments, inserted 3 to 5 mm. below the throat; filaments glabrous, flattened, 1.5 mm. long; anthers 5 mm. long, attached on the back below the middle, 1 mm. wide, the base acutely bilobed, the back bearded.

Timonius gammillii Elm. n. sp.

A shrub-like tree; stem 1 dm. thick, 5 m. high, branched from the middle, not strictly erect nor terete; branches numerous, the ultimate slender ones with ascendingly curved tips; wood dingy or yellowish white, bitterish, odorless, quite hard; old bark peeling in thin plates, smooth on the branches, grayish white. Leaves opposite, mostly toward the ends of the twigs, horizontal, coriaceous, nearly flat, a trifle paler

green beneath, oblong acute to acuminate at the apex, base cuneate or obtuse, entire, variable in size, the medium ones 15 cm. long, 5 cm. wide across the middle, drying green, glabrous except the veins beneath; nerves prominent beneath, in the young state curved and with soft appressed yellowish brown hairs, the 5 to 7 lateral ones ascendingly curved; petiole stout, 7.5 mm. long, pubescent when young, ultimately becoming glabrous; stipules about as long, similarly hairy on the dorsal middle portion, ovately triangular, terminating into a setose point. Peduncles usually solitary in the uppermost leaf axils, 2 to 5 cm. long, green and covered with olivaceous hairs, short branched toward the top; flower erect, sessile, apparently in 2 alternating rows along the upper side of the dichotomous branches, subtended on the lowermost by an acuminate bract; calyx cup-shaped, yellowish gray pubescent, 3 mm. long, nearly as wide across the top, green except the purplish brown rim of 5 apiculate teeth; corolla terete, at least 2 mm. thick, 15 mm. long, finely pubescent, yellowish, fleshy, the upper 5 mm. divided into 4 obtusely pointed rather thick segments; stamens 4, alternating with the segments, inserted at the middle of the corolla; filaments less than 0.5 mm. long, glabrous; anthers light yellow, nearly 4 mm. long, only partly exceeding the throat, linear, 1 mm. wide, attached on the back below the middle, introse, with a minute point at the rounded apex; style glabrous, bilobed; fruits not seen.

Type specimen 12469, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910.

A rather pretty species commonly seen in moist gravelly soil of wooded banks along the Pauala river at 1000 feet. Named after *J. A. Gammill* who first collected it for the Forestry Bureau on Guimaras island. See his number 299.

This is obviously not the Malayan *T. rumphii DC.* which *Dr. Valeton* considers identical to *T. sericeus (Desf.) K. Sch.* The size, shape and pubescence of the foliage is different, besides other characters in the flowers and fruits. *Elmer* 12148 from this same locality has smaller leaves and more numerous inflorescences, but otherwise the same. This is the species we heretofore referred to *T. rumphii DC.*

PAVETTA Linn.

Pavetta dolichostyla Merr. in Philip. Journn. Sci. Suppl. I; 239, 1906.

Type specimen is Forestry Bureau number 3714 from Mindoro, collected by *Mr. Merritt* in 1906. Very near to *P. barnesii Elm.*

Pavetta meyeri Elm. n. comb. *Webera meyeri (Elm.) Merr.* in Philip. Journn. Sci. Suppl. I; 133, 1906. *Ixora meyeri Elm.* Leaf. Philip. Bot. I; 68, 1906.

Rare! *Webera* is also a moss genus.

Pavetta eucrantha Elm. n. sp.

Low shrub; stem suberect, more or less nodulose, 2.5 cm. thick, 1 to 1.5 m. high; branches from below the middle, quite rigid, spreading, only sparingly rebranched, the ultimate ones suberect; wood soft, sappy white, odorless, sweetish, with a large white pith; bark dull green. Leaves leathery, ascending or horizontal, flat, the abruptly acuminate apex recurved, much paler green beneath which has a rough feel, smooth on the upper side, drying nearly black, base short and abruptly acuminate, entire, the larger ones over 2 dm. long, nearly 1 dm. wide across the middle, oblong to elliptic, the shorter obovately so, opposite, usually 2 or 3 pairs at the end of the branchlets, glabrous or only the nerves pubescent beneath; midvein quite prominent, the lateral ones 5 to 8 on each side, all conspicuous beneath, oblique, very finely dirty brown pubescent, their ends arched and united, with coarse but faint reticulations; petiole 1 to 2 cm. long, scurfy puberulent beneath, ultimately glabrate; stipule rim-like, subtruncate, 4 mm. deep. Inflorescence erect, terminal, dark green, appressed hairy, subtended by a stipule-like involucral bract, less than 3 cm. long, branched from near the base, cymosely branched, the short branchlets subtended by acuminate bracts; calyx subsessile, subtended by sharply pointed bracteoles, 4 mm. long, the upper one half divided into 5 sharply acuminate segments; corolla creamy white, sparsely pubescent on the outside,

involute and slightly twisted to the left; segments oblong, acute at apex, separating nearly to the base, 5; stamens pale white, also 5, upon very short filaments, inserted upon the glabrous throat of the short corolla tube; anther linear, basifixed, 4 mm. long, acute at apex, bifid at base; style glabrous, entire, also whitish; fruits not seen.

Type specimen 12492, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910.

A sparingly branched undershrub, among herbaceous jungle. This also my be considered only a form of *P. indica Linn.*

IXORA Linn.

Ixora capitulifera Merr. in Philip. Journ. Sci. V; 233, 1910.

Type collected on mount Victoria, Palawan, by *Dr. F. W. Foxworthy*, Bureau of Science number 686.

Ixora crassifolia Merr. in Philip. Journ. Sci. V; 233, 1910.

A remarkable thick and rigid leaved *Ixora*. Type is Bureau of Forestry number 9439, collected by *Messrs. Whitford* and *Hutchinson* at Port Banga, district of Zamboanga, Mindanao.

Ixora macrophylla Bartl. in *DC.* Prod. IV; 487, 1830.

Very common in nearly all the islands.

Type collected about Manila and has previously been referred by me, in part at least, under *I. cumingiana Vid.*

Ixora bibracteata Elm. Leaf. Philip. Bot. I; 8, 1906.

This species has not since been recollected. Is quite distinct from all other known Philippine species of *Ixora.*

Ixora chinensis Lam. Encyc. III; 344.

A native of China and cultivated in the Philippines for ornamental purposes. So is also the closely related species *I. coccinea Linn.*

Ixora congesta Roxb. Hort. Beng. 83.

This species has recently been collected in Mindanao. A close ally of *I. leytensis Elm.*

Ixora cumingiana Vid. Phan. Cuming. Philip. 183, 1885. *I. barbata Roxb.* by *Elmer* Leaf. Philip. Bot. I; 9, 1906.

About as common and as widely spread as *I. macrophylla Bartl.* Throat glabrous, not barbate.

Ixora ebracteata Merr. in Philip. Journ. Sci. V; 235, 1910.

Type is *Curran's* from Zambales province, Forestry Bureau number 5845. There are a number of other sheets in the herbarium, all from the some province. Number 12335 of my recent collection on Sibuyan island is typical, and I therefore attach my field-note:—Slender erect tree in moist red gravelly soil of woods along the Sinuban creek at 750 feet; stem 1.25 dm. thick, 9 m. high, branched above the middle; branchlets suberect, comparatively short and forming an elongated crown; wood brownish white, odorless and tasteless, hard, brittle, heavy; bark smoothish, dull brown to gray on the branches. Leaves ascending, curved upon the upper side, dull green, a trifle paler beneath. Inflorescence erect, its main peduncles green and subterete, the pedicels and calyx purplish brown; corolla nearly 2 cm. long, 4-lobed, white; the short filaments and style also whitish; anthers as well as the stigma yellowish; fruit globosely flattened, dark wine red when mature, usually with 2 seeds. This is another one I allowed to slip by under the old name, *I. amboinica DC.*

Ixora mearnsii Merr. in Philip. Journ. Sci. V; 236, 1910.

The type is Bureau of Science number 2999, collected by *Maj. E. A. Mearns* at Casiguran, province of Tayabas, Luzon.

Ixora mindanaensis Merr. in Philip. Journ. Sci. V; 237, 1910.

Based on Forestry Bureau number 9010, collected by *Messrs. Whitford* and *Hutchinson* at Port Banga, district of Zamboanga, Mindanao.

Ixora palawanensis Merr. in Philip. Journ. Sci. V; 238, 1910.

Based on Bureau of Science number 793, collected by *Dr. F. W. Foxworthy* near Iwahig, Palawan.

Ixora longissima Merr. in Philip. Journ. Sci. V; 235 1910.

Based on Forestry Bureau number 16975, collected by *Rosenbluth* on the island of Leyte.

Ixora philippinensis Merr. in Philip. Journ. Sci. V; 238, 1910.

The type is based on Forestry Bureau number 2299, collected by *R. Meyer* along the Lamao river, province of Bataan, Luzon. This, like *I. coccinea Linn.*, is an introduced species and is planted for ornamental purposes.

Ixora littoralis Merr. in Philip. Journ. Sci. V; 240, 1910.

Bureau of Science number 1274, collected by *Mr. R. C. McGregor* at Tagbilaran, Bohol.

Ixora auriculata Elm. n. sp.

Erect shrub; stem terete, more or less wand-like, 3.5 cm. thick, 3 m. high; branches above the middle, long, widely spreading, sparingly rebranched, the ultimate ones somewhat drooping, very rigid, flattened and glabrous on the green twigs; wood moderately hard, yellowish white, slightly fetid, tasteless; bark dull brown, smooth or only obscurely lenticelled. Leaves rigidly coriaceous, mostly descending, dull green above, much paler beneath, with a yellowish green midvein, flat, drying brown, widely scattering along the glabrous branchlets, opposite, sessile or nearly so, entire but edges irregularly corrugated in the dry state, linear ob-

long, 2 to 3 dm. long, 5 to 6 cm. wide, apex gradually coming to an acute point, base rounded with shallow auriculate lobes, glabrous and smooth on both sides; stipules also glabrous, rigid, brown, forming a cupular rim the back of which prominently extends into a setaceous point 1 cm. long; midvein very prominent beneath, the lateral ones irregularly scattered, nearly at right angles to the midvein, faint and obscure, tips faintly connected, thereby forming flat arches 3 to 5 mm. from the margin, 13 to 16 on each side, reticulations coarse and only evident toward the arches. Inflorescence terminal; peduncles solitary or 2 to 3, arising from a short bracteate terminal suberect branchlet, pendulously recurved, glabrous, slender, about as long as the foliage, deep red as are also the secondary stalks; branches broadly paniculate, 7 to 10 cm. long, fully as wide across the base, all glabrous; bracts subpersistent, sharply acuminate, 2 mm. long; pedicels strict, 1 cm. long; terminal flower sessile, the 2 lateral ones pedicellate, subtended by a pair of sharply pointed bracteoles; calyx deep red, also the pedicels and subtending bracts, turbinate, glabrous, quite rigid, 3.5 mm. long including the 4 apiculate teeth; corolla glabrous, 2 cm. long, with a 12.5 mm. long tube, bright red toward the base, otherwise white, fleshy, also rather rigid; segments 7 mm. long, 4 mm. wide across the middle, elliptic, obtuse or acute at apex, 4, fleshy, deeply concave on the upper side, the tube sparsely strigose on the inner surface; stamens inserted upon tne throat; filaments 4, thick, succulent, 1 mm. long, compressed, persistent; anther linearly oblong, 4.5 mm. long, acute at apex, bilobed, attached at the base above the lobes; style very slender, little exceeding the corolla, glabrous, terminated by 2 rather thick flattened stigmatic arms.

Type specimen 12483, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910.

This handsome species was discovered in moist humus covered soil of densely wooded flats along woodland streams from 750 to 1000 feet elevation.

Ixora bartlingii Elm. n. sp.

A shrub; stem 7.5 cm. thick, 4 mm. high, subterete, branched toward the top only; branchlets lax, slender, widely spreading, crookedly rebranched; wood quite hard and heavy, yellowish, brown in the center, tasteless, with a peculiar odor reminding one of decaying fresh fruits; bark dull brown, smoothish. Leaves glabrous, mostly horizontal, slightly recurved, shining green on the upper side, much paler beneath, chartaceous or membranaceous, entire margins, 2.5 dm. long, 1 dm. wide across the middle, frequently much smaller, oblong, abruptly acute at apex, base in the smaller blades obtuse the larger ones rounded, oblong; petiole averaging 2 cm. long, glabrous, brown; stipule persistent, forming a shallow rather thick rim, the midvein portion extended into a setaceous point, 1 cm. long; veins brown, conspicuous especially beneath, smooth, brown, 11 to 17 on each side of the very prominent midvein, brown, their ends more or less united, reticulations coarse and quite conspicuous. Inflorescence terminal, usually subtended by a pair of stipules and a pair of small leaves; peduncles slender, glabrous, pendulously recurved, usually solitary, 2 to 3 cm. long; branches divaricate, forming a loose dichotomously branched cyme 1 dm. across, deep red, glabrous, articulate and subtended by short sharply acute bracts; pedicels 5 mm. long, also articulate; calyx turbinate, 3 mm. long, as smooth and of the same color as the stalks, subtended by a pair of minute acute bracts, bluntly 4-toothed; segments of corolla 4, venose on the lower side, oblong, 9 mm. long, obtuse, 4 mm. wide, the sides curved upon the under side, reflexed; tube 1.5 cm. long at least, glabrous, creamy white as are also the segments, tube at the base pinkish; stamens 4, inserted on the throat; filaments also whitish, flattened, 3 mm. long; anthers 5 mm. long, acute at both ends, attached on the back below the middle, versatile and reflexed upon the filaments; slender style glabrous, of the same color; stigma fleshy, broad, flattened, greenish; fruit globosely and obscurely flattened, 2-celled, 2-seeded, 7.5 mm. across; seeds circular, planoconvex, attached to the middle.

Type specimen 12223, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

In alluvial soil of a densely forested humid flat at 1000 feet, along the Pauala river. Named after *Bartling* who has published a number or Philippine *Rubiaceae*.

Most closely related to *I. macrophylla Bartl.* but leaves more membranous, not cuneate at the base; inflorescence not congested, entirely glabrous; branchlets in ours articulate and with subtending bracts.

PSYCHOTRIA Linn.

Psychotria luzoniensis Vil. in *Blanco's* Fl. Filip. III. Nov. App. 112. *P. tacpo* (*Blco.*) *Rolfe* in Journ. Linn. Soc. XXI; 312, 1884. *Paederia tacpo Blco.* Fl. Filip. I; 160, 1837.

A common quite variable shrub all over the Philippines, from the seacoast up to 1500 feet or through the cogon formation. Never found in subalpine forests and in alpine regions. The native name given to my number 12165 from Romblon is "Tacpo." *P. pauciflora Bartl.* in *DC.* Prod. IV; 522, 1830 is undoubtedly a form of this species with smaller leaves and short only sparingly branched inflorescences.

Psychotria ixoroides Bartl. in *DC.* Prod. IV; 522, 1830.

This has strong affinities with *P. paloense Elm.* and *P. tayabensis* of the same author. In the latter species the inflorescence as well as the infrutescence is a sessile head, while *Bartling's* species is at least short branched. Again, *P. ixoroides Bartl.* is likewise different from the former is being glabrous, leaves long attenuate toward the base with obscure nerves. All of these three species are about equally rare.

Psychotria phanerophlebia Merr. in Philip. Journ. Sci. V; 243, 1910.

Based upon Bureau of Science number 7404, collected by *Maximo Ramos*, near Pamplona, province of Cagayan, Luzon.

Psychotria ramosii Merr. in Philip. Journ. Sci. V; 244, 1910.

The type is Bureau of Science number 7499, from Pamplona, of Cagayan province, Luzon. Named after the native collector.

Psychotria linearis Bartl. in *DC.* Prod. IV; 522, 1830. *Amaracarpus longifolius Elm.* Leaf. Philip. Bot. I; 1, 1906.

During the past few years some good fruiting specimens were collected in the provinces of Tayabas and Rizal, and it certainly is a *Psychotria.*

Psychotria cervinus Elm. n. comb. *P. diffusa cervinus Elm.* Leaf. Philip. Bot. II; 592, 1909.

Sufficiently distinct to be ranked as a species.

Psychotria cephalophora Merr. in Philip. Journ. Sci. III; 438, 1908.

Only one specimen known from Camagin island collected by *Eugenio Fenix* in 1907, Bureau of Science number 4048. The infrutescence is as in *P. tayabensis Elm.*, but the leaves are entirely too large.

Psychotria crispipila Merr. in Philip. Journ. Sci. Suppl. I; 240, 1906.

The type is based upon *E. D. Merrill's* number 4490, collected on mount Data, district of Lepanto, Luzon, in November, 1905. A number of other sheets have been collected on the higher montains of Benguet and Lepanto. The writer first collected it on mount Santo Tomas in June, 1904, and was chucked away in the *Viburnum* genus cover. Four months later *Mr. Williams* also collected it on the same mountain. More recently it has also come in from the Lake Lanao region through *Mrs. Clemens.*

Psychotria macgregorii Merr. in Philip. Journ. Sci. V; 389, 1910.

Based upon *Merrill* 8495 and collected by him on mount Pulog, province of Benguet, May, 1909. There are several sheets in the herbarium, all from the same mountain.

Psychotria ovalis Elm. n. sp.

Epiphytic or rather scandent; branches freely rebranched, forming a more or less interlaced mass, terete, the older ones 15 mm. thick; twigs softly pubescent with dark fuliginously colored hairs. Leaves opposite, widely scattering along the branchlets, shining dark green above, paler beneath, drying dark brown, pubescent beneath, the upper surface only sparsely strigose but eventually becoming glabrous, oval, 7 cm. long, 4 cm. wide across the middle, entire, base rounded, apex coming to a short abruptly acute point; petioles 5 mm. long or the larger leaves with a petiole twice as long, densely covered with similarly colored hairs; nerves depressed upon the upper surface, prominent beneath, slightly ascending, subparallel, arched and united below the margin, reticulations obscure, 7 to 9 pairs, all densely hairy beneath; stipule rather broad, obtusely rounded, deciduous, pubescent on the back toward the base, otherwise glabrous, brown. Inflorescence terminal, usually upon 3 peduncles; peduncles dark fuliginously hairy, about 4 cm. long, branched from the middle; branches divaricately branched, 5 cm. long, all the branchlets subtended by 1.5 mm. long sharply pointed bracts; buds clustered upon short stalks; calyx short, subglabrous, obtusely 4-toothed; petals also short, 4, nearly free, valvate; stamens 4, upon very short filaments, the anthers broadly oval; pedicels of the fruits 1 to 3 mm. long, yellowish green in the dry state, elongate, ellipsoid, 4 mm. long, 2.5 mm. thick across the middle, 2-celled, bearing the blackish brown sparsely apiculate calyx rim; pyrenes 3.5 mm. long, at least 2 mm. across the middle, plane on the ventral side, highly convex on the dorsal side and with 4 obscure longitudinal more or less granular ridges especially toward the base.

Type specimen 10567, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, May, 1909.

Upon trees in dense woods along a ridge south of mount Calelan at 4250 feet.

One of several closely related Philippine species, and can be distinguished from *P. ovoidea Wall.* by the very different fruits upon a differently branched infrutescence.

Psychotria gitingensis Elm. n. sp.

Shrub; stem 3 to 7 cm. thick, 3 m. high; branches usually arising above the middle, few but widely spreading, twigs suberect; wood slightly bitter, odorless, greenish white, soft and easily breaking; bark very smooth, brown. Leaves usually crowded toward the ends of the branchlets, opposite, thickly coriaceous, deep green above, much lighter beneath, nearly flat and with apex recurved, entire margins subinvolute in the dry state, drying brown, usually somewhat obovate or oblongish, apex abruptly short acute, base cuneate, glabrous, blades 12 cm. long, 4 cm. wide above the middle; nerves prominent beneath, 9 to 11 pairs, divaricate, gradually arched and submarginally united, brown, reticulations obscure; petioles glabrous, dark brown, 1 cm. long; stipule a 5 mm. wide, brown and rather thick rim, leaving a yellowish scar after falling. Peduncle erect, dark green, glabrous, usually solitary, 5 cm. long; branches divaricate, forming an ovately outlined rather dense infrutescence, usually verticelled, articulate, subtended by small apiculate bracts; calyx turning black, turbinate, subtended by a pair of bracteoles, also glabrous, 2 mm. long, minutely 5-apiculate; other parts of flowers not seen; fruits lighter green, short ellipsoid, more tapering toward the base in the dry state, nearly 1 cm. long, exocarp thick and drying black, 2-celled; pyrene elliptic on the plane surface, 7.5 mm. long, 5 mm. wide across the middle; its dorsal side high, 1 or obscurely 2-ridged, flattened toward the base.

Type specimen 12431, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910.

An undershrub in moist stony soil of a forested ridge at 2750 feet.

Similar to *P. subalpina Elm.*, but pyrenes very little ridged or nearly smooth; leaves larger, with the brown prominent lateral nerves plainly united. The stipules are also different.

Psychotria similis Elm. n. sp.

An erect undershrub; stem 3 cm. thick, 3 m. high; branches mostly above the middle, lax, widely scattering, conspicuously nodulose, curved, the ultimate ones slender and suberect; wood rather soft, dirty white, odorless and tasteless; bark very smooth, dark or dull brown. Leaves flat, coriaceous, mostly ascending and crowded toward the ends of the twigs, shining green above, subglaucescent beneath, glabrous, oblanceolate, apex acute to acuminate, base slenderly attenuate, the entire margins slightly involute in the dry state, 12 cm. long, 3 cm. wide above the middle, the terminal ones usually smaller; petioles glabrous, 1 cm. long; nerves 9 to 12 on each side of the prominent brown midvein, faint, slightly curved and with tips united, reticulations obscure; stipule brown, broad, 5 mm. long, truncately obtuse, caducous. Inflorescence entirely glabrous, erect, pale green and drying brown, 1 dm. long, branched above the middle, usually with only 1 peduncle; secondary stalks forming a cymose panicle, 5 cm. across, subtended by small bracts; terminal flower sessile, the lateral ones upon 3 to 5 mm. long whitish pedicels; calyx turbinate, 2.5 mm. long, 2 mm. across at the truncate or scarcely 5-apiculate rim; corolla pure white, odorless, 8 mm. long, 2 mm. across the short basal tube, glabrous except the hairy throat; segments 5, oblong, obtuse, thick, 5 mm. long, 1.5 mm. wide; stamens 5, inserted upon the throat; filaments smooth, 0.5 mm. long; anthers 1.25 mm. long, oblong, basifixed; style glabrous, as long as the corolla, terminated by 2 clavate segments which are puberulous along the upper stigmatic side; drupes pale green, elongated ellipsoid, obovoid in the dry state, bearing the calyx rim, 7.5 mm. long, 4 mm. across the middle; pyrene 6.5 mm. long, 4 mm. wide, plano-convex, obtuse at apex, base pointed, with an obscure dorsal ridge.

Type specimen 12439, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910.

This undershrub was collected in red compressed soil between rocks on a wind swept forested ridge at 3000 feet. Called by the natives or Visayan "Betanghol."

Not *P. pinnatinervia Elm.*, inflorescence more laxly branched,

corolla twice as long; fruits in ours very little ridged, lateral ridges inconspicuous. In the same manner the infrutescence differs from *P. subalpina Elm.* which has ridged pyrenes.

Psychotria plumeriaefolia Elm. n. sp.

Suberect shrub; stem 4 to 7 cm. thick, 3 to 4 m. high, crooked; branches arising from below the middle, sparsely rebranched, the greenish twigs suberect; wood sappy white, rather soft, odorless, with a faint bitter taste; bark very smooth, dull brown or more or less mottled with greenish gray. Leaves heavy, leathery, horizontal, flat, with short acute tips recurved, very deep green above, beneath much paler green or even subglaucescent, turning grayish brown while drying, with graceful entire margins, cuneate at the base, elliptic or obovately elliptic, the average blades 2 dm. long, 1 dm. wide across the middle or a trifle above this, occasionally very small lanceolate ones are on the same twigs, glabrous; petiole 2 to 4 cm. long, glabrous, dirty brown; stipule glabrous, triangularly acuminate, 1 cm. long, brown, caducous; nerves 14 to 17 pinnate pairs, oblique, parallel, curved and reticulately united at their ends, otherwise the reticulations are barely visible, very conspicuous beneath, reddish brown. Infrutescence less than one half as long as the foliage, usually upon 3 peduncles, 1 dm. long, entirely glabrous, deep green; flowers more or less clustered; bracts of the pedicels and flowers obsolete; calyx short stalked, glabrous, truncate, short, 2 mm. wide at the rim; corolla 3 mm. long, glabrous except the throat, very short tubular, the 5 oblong segments fleshy and with incurved tips; stamens also 5, inserted upon the throat; glabrous filaments 0.33 mm. long; anthers 1 mm. long, broadly oblong, attached along the front side of the very much enlarged connection; disk of the rounded ovary of the same peculiar whitish color as the connection; style similar in color, 2 mm. long, barely lobed at the apex, the stigmatic sides yellowish puberulent; drupes subglobose, 7.5 mm. long; pyrenes obovate from the concave ventral side, 6.5 mm. long, nearly as wide above the middle, with 3 obscure ridges, the middle ridge rather prominent and broad.

Type specimen 12250, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

Inhabiting stony reddish soil of wooded banks along the Agdamagan creek at 750 feet. Observed along all the water courses.

Its affinity is close to *P. banahaensis Elm.*, but leaves larger and widest above the middle, base distinctly cuneate, apex more abruptly acute, nerves beneath less prominent, more numerous and staighter.

Psychotria longipedunculata Elm. n. sp.

A scandent shrub; stem flexible, 2 cm. thick, terete; branches at the top, slender, lax, the ultimate ones green and ascendingly curved, forming tangled masses, the free slender branchlets subpendulous. Leaves coriaceous, recurved especially toward the short acute tip, shining deep green on the upper shallowly folded side, much paler beneath, glabrous, drying brown, oblong to subelliptic, entire margins subinvolute in the dry state, 13 cm. long, nearly one half as wide across the middle, base abruptly cuneate to obtuse, opposite, scattering along the branchlets; nerves 7 to 9 on each side of the conspicuous midvein, ascendingly arched toward their tips, dark brown; petiole similar in color, smooth, 4 cm. long or less; stipule caducous, 5 mm. long, brown, obtusely rounded at the apex. Peduncle mostly solitary, 1 dm. long at least, smooth, ascending, quite rigid; branches all glabrous, forming a corymbose panicle, 7.5 cm. high, wider across the base, subtended by apiculate bracts; pedicellate calyx turbinate, 3 to 4 mm. long, truncate or minutely 5-apiculate, glabrous; corolla tube 6 mm. long, relatively thick, smooth except the dense hairs in the region of the throat, yellowish green; segments 5, triangularly oblong, 3.5 mm. long, gradually recurved; stamens of the same number, alternating with the segments and inserted upon the throat; filaments glabrous, 2 mm. long, brown; anthers 1.5 mm. long, oblong, dorsifixed; style slender, as long as the corolla, terminated by 2 stigmatic arms.

Type specimen 12532, *A. D. E. Elmer*, Magallanes (Mt.

Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910.

A slender tree climber in very humid woods of a fertile alluvial flat olong the Patoo river at 750 feet. Only once seen. The Visayan on Sibuyan call it "Lipai."

Psychotria sibuyanensis Elm. n. sp.

A scandent shrub; stem terete, the size of an ordinary lead-pencil, flexible; branches green, likewise flexible, minutely whitish spotted, half drooping and interlaced, quite slender; wood greenish, with a large pith, soft, odorless and tasteless; bark smooth, greenish gray. Leaves horizontal, coriaceous, easily breaking, shining and very deep green on the upper flat surface, glabrous, the acute to acuminate apex recurved, much paler green beneath, slenderly attenuate at the base, narrowly elliptic to oblong or oblanceolate, opposite, scattered along all the twigs, the entire margins subinvolute in the dry state, drying green, 10 cm. long, 2.5 cm. wide; side nerves 7 to 11, similarly faint on both sides, divaricate, archingly united a few mm. below the margin, reticulations none; stipule caducous, brown, dry, 4 mm. deep or less, with a blunt point; petiole glabrous, 1 to 2 cm. long. Inflorescence suberect, corymbosely paniculate, rather dense and 3 cm. wide in the flowering state, upon a 3 to 5 cm. long peduncle, greenish gray puberulent, subtending bracts sharply acuminate, 1 to 2 mm. long; calyx upon short stalks, truncate or obscurely 5-denticulate, 2.5 mm. across the top, subtended by nearly obsolete bracteoles; corolla 4 mm. long, 2.5 mm. thick, glabrous except the exceedingly dense woolly throat; segments 2 mm. long, triangularly oblong, 5; stamens inserted upon the throat, as many as there are corolla segments and alternating with them, filament glabrous, slender, 1 mm. long; anther basifixed, truncately oblong, a trifle shorter than the filaments; style 0.75 mm. long, bearing an equally long clavate stigma which soon divides into 2 thick flattened lobes; fruits dark green, 7.5 mm. long, ellipsoid, 6 mm. thick above the middle, with the calyx rim persistent, in the dry state strongly ridged; pyrene flat and shortly obovate from the ventral side, 6 mm. long,

5 mm. wide above the middle, the dorsal surface with 4 prominent rugose ridges besides the lateral plates.

Type specimen 12355, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

A low rather small tree climber along the trail to España, on the ridge at 2000 feet.

P. kunstleri K. et *G.*, but stem and branches always terete even in the dry state, stipule larger and differently shaped. There are also some differences in the leaves and inflorescence. The flowers of *King* et *Gamble's* species are not known.

Psychotria lianoides Elm. n. sp.

A powerful climber; stem 3 to 7 cm. thick, terete, ultimately divided into long main branches; branchlets spreading, the free ends hanging, the green tips ascendingly curved; wood soft, whitish, odorless and tasteless or with an indistinct sweet taste, porous, flexible; bark one third the radius in thickness, smooth, very dull brown or grayish mottled on the branches, green beneath the epidermis, the balance pinkish white. Leaves opposite, coriaceous, scattered along the 2 year old branchlets, horizontal, the acute apex recurved, shining dark green above and curvingly folded, beneath duller and somewhat paler green, ovately oblong, 1 dm. long including the stalks, 5 cm. wide below the middle, the entire margins involute in the dry state, base broadly or truncately rounded, glabrous except the midvein beneath; petiole 1 cm. long, pubescent when young, ultimately glabrous; lateral nerves about 9 on each side of the prominent dirty brown midvein which wears glabrous with age, divaricate, quite conspicuous beneath, faintly united beneath the margin, the coarse reticulations quite in evidence; stipule thick, brown, caducous 7.5 mm. long, broad at apex. Inflorescence terminal, cymosely pedunculate, usually with 3 main peduncles, ascending, short ovate in outline, 2 dm. broad, nearly as long; stalks branched from the middle, whitish subtended by short yet sharply pointed bracts, subglabrous; calyx short stipitate, green, the narrow rim nearly 2 mm. wide, truncate or minutely denticulate, yellowish pulverulent as

are also the ultimate branchlets but which soon become glabrous; corolla 4 mm. long, 1.5 mm. thick, creamy white, the 4 segments strongly reflexed and ultimately split to below the throat, glabrous except the olivaceous hairs in the throat; segments oblong, obtuse at apex, 2 mm. long, nearly 1.5 mm. wide; stamens 4, alternating with the segments; filaments glabrous, slender, 3 mm. long, adnate to the middle of the corolla tube; style with the 2 linear stigmatic lobes scarcely exceeding the corolla; anthers yellow, 0.5 mm. long, ellipsoid, attached on the back below the middle; fruits 4 mm. long, ellipsoid, bearing the persistent calyx rim, whitish, 2-celled, smooth; pyrenes elliptic on the plane ventral side, 3 mm. long, 1.5 wide across the middle, rounded and without ridges on the back.

Type specimen 11645, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September, 1909.

Sprawling and forming dense masses over the tops of lofty trees in humid forests along the edge of the Baruring river on the trail to Talon, at 4000 feet altitude. "Gualog" is the Bagobo name.

It is a distant relative of my *P. ramosissima* from Lucban, Tayabas province, Luzon.

Psychotria arborescens Elm. n. sp.

Tree; stem 3 dm. thick, 8 m. high; branches chiefly above the middle, crookedly rebranched, twigs ascendingly curved; wood soft, sappy white, neither odorous nor with taste; bark smooth, brown, gray as the branches. Leaves coriaceous, ascendingly spreading, dark shining green on the upper side, much paler beneath, flat or only the very short acute tips recurved, glabrous, opposite, usually crowded toward the ends of the twigs, obovately oblong or merely obovate, margins entire and curved upon the under side in the dry state, cuneate at the base, rounded at the apex except the short point, 2 dm. long, 7.5 cm. wide above the middle; petiole stout, subglabrous, 3 cm. long; stipule caducous, broadly oblong, glabrous, rigid, brown 1 cm. long at least; nerves prominent beneath, about 11 pairs, ultimately glabrous, ascendingly curved especially toward their ends, the coarse reticulations relatively faint. Inflorescence termi-

nal, erect, of 3 to 5 rather thick and glabrous peduncles varying from 5 to 9 cm. long, subtended at the base by deciduous bracts; secondary branches once or twice umbellately branched, also stout, articulate, spreading, their subtending bracts very short or obsolete; pedicels thickened and brown, fimbriate at the distal end, usually with 1, 2 or 3 sessile flowers; calyx ovoidly globose, 7.5 mm. long, glabrous, dark green, with a short truncate rim; corolla 6 mm. long, rigid, with only a very short tube, glabrous except the pubescent throat; segments 5, triangularly acute, nearly 4 mm. long; stamens 5, inserted upon the throat; filaments glabrous, 0.75 mm. long, alternating with the segments; anther oblong, nearly 2 mm. long, attached dorsally below the middle; style 2 mm. long, separating from the top into 2 parts, bearing 2 thick and recurved stigmatic lobes which are puberulent along the upper side; young fruits obovoidly ellipsoid, smooth, nearly 1.5 cm. long, bearing the short calyx rim, 2-celled, with 2 pyrenes.

Type specimen 11263, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, August, 1909.

A fine straight tree in humid forested flats at 4000 feet on the trail to Baclayan, the mount Apo summit station. The Bagobos call it "Magsangad."

A near relative of *P. angulata Korth.* of Burma from which ours differs mainly in having larger leaves, longer petioles, stipules twice as long and other characters in the flowers at least.

Psychotria mindoroensis Elm. n. sp.

Scandent upon medium-sized trees; stem 1 cm. thick; the branches only one half as thick, terete, smooth, forming tangled masses, the free ends more or less hanging, with tips suberect. Leaves opposite, widely scattering along the branchlets, subcoriaceous, darker green above, drying reddish brown, entire, subelliptish to ovate, apex obtuse to acute, base rounded or obtuse, glabrous, 8 cm. long, one half as wide below the middle; petiole glabrous, 5 mm. long, lateral nerves 5 to 7, divaricate, faint, the obscure tips arched and united a few mm. below the margin, stipule

brown, nearly 5 mm. long, fully as broad; peduncle glabrous, usually solitary; secondary stalks divaricate, arising from above the middle, bearing 3 to 5 flowers; pedicels also glabrous, 1.5 mm. long; calyx turbinate, 2 mm. deep, as wide across the truncate or barely apiculate rim, very smooth; corolla 5 mm. long, tubular, glabrous except the woolly throat, divided to the middle into 5 oblong and obtusely pointed rather thick segments; stamens 5, alternating with the segments; filaments glabrous, 1.5 mm. long; anthers ellipsoid, 1 mm. long, retuse at both ends, basifixed; ovary disk round, quite prominent, glabrous; style short, glabrous, apparently 2 or 3, straight, forked; fruits not seen.

Type specimen 12532, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910.

A tree climber of a very damp forested flat of alluvial soil at 750 feet; only a fragment of this was secured from the same tree upon which *P. longipedunculata Elm.* was discovered. As early as 1905 of the same month *Mr. R. C. McGregor* discovered it along the Baco river, Mindoro.

CHASALIA Comm.

Chasalia membranifolia (Bartl.) Elm. n. comb. *Psychotria membranifolia Bartl.* in *DC.* Prod. IV; 522, 1830.

Number 12314 *Elmer* from Sibuyan island is typical in shape and venation of leaves, short inflorescence, short and rather broad flowers of *Bartling's* species which came from Sorsogon, Luzon. Rather widely distributed, but nowhere common. On my field label for the above number is the following note:— An undershrub of a forested ridge at 2000 feet; stem 1.5 m. high, 15 mm. thick, sparingly branched from below the middle; wood rigid, yellowish white, quite brittle, without taste or odor; branches few, rigid, brown, smooth. Leaves horizontal, flat, much darker green above, more or less recurved, thinly coriaceous. Buds, flowers and fruits erect and flesh red, the latter are elongated and globose, the soft short stalks are of the some color.

Chasalia curviflora Thw. Enum. Pl. Zeyl.

Number 12199 *Elmer* from Sibuyan island is typical. Its range in the Philippine seems to be from southern Luzon southward toward Borneo. The field-note for the above number reads:—Erect shrub in well drained clay of a densely forested ridge at 1000 feet; stem nearly 5 mm. thick, 5 m. high, terete, more or less crooked, sparingly branched toward the top; wood whitish, quite rigid but not hard, odorless and tasteless; bark yellowish gray, smooth or becoming minutely checked; twigs erect, green. Leaves coriaceous, mostly horizontal, apex recurved, otherwise flat, very dark green and shining above, paler beneath. Inflorescence terminal, erect, rather rigid, odorless, pure white or only the peduncles and main pedicels tinged with red. Very showy and pretty as an undershrub of the forests!

Chasalia obscurinervia Elm. n. sp.

Lax shrub; stem 3 m. high, laxly branched; the twigs green, terete, smooth, with stipules at the leaf scars and at the point of branching. Leaves horizontal or descending, thinly coriaceous, much paler green beneath, the midvein beneath and toward the petiole reddish, glabrous, ovately oblong, entire, apex rounded and with a short obtuse point, base alternate, the larger blades 15 cm. long, nearly 5 cm. wide above the middle, frequently much shorter and narrower; petiole glabrous, 1 cm. long; stipule also glabrous, broadly ovate, with a short acute point; veins 5 to 7 on each side of the prominent midvein, ascendingly arched, faint but rather plainly impressed, reticulations coarse and very obscure. Flowers not seen; infrutescence terminal, 3 to 5 cm. long, short branched above the middle, about 3 cm. wide, erect, all the glabrous stalks red; branchlets and pedicels subtended by short acute bracts; fruits apparently immature, globose, green, with purlish red stigmatic portions, 7.5 mm. in diameter, usually marked with 4 faint ridges or grooves, 2-celled, 2-seeded; exocarp quite thick and horny, the inner side of the halves deeply concave; seed apparently immature, very flat, circular, concavo-convex, 6 mm. across.

Type specimen 11200, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, July, 1909.

Discovered in dry woods or forests of fertile soil along the Sibulan river and Baracatan creek from 1250 to 2500 feet. The Bagobos call it "Cayut-dimokod."

Apparently somewhat related to the Javan and Sumatran *C. expansa (Blm.) Miq.*

LASIANTHUS Jack.

Lasianthus cyanocarpus Jack. in Trans. Linn. Soc. XIV; 125, 1823. *Villar* Nov. App. 112, 1880. *Merr.* in Philip. Journ. Sci. V; 240, 1910.

Lasianthus clementis Merr. in Philip. Journ. Sci. III; 164, 1908.

Of this species there are several specimens in the herbarium, Bureau of Science, collected by *Mrs. Clemens* in the Lake Lanao region of central Mindanao.

Lasianthus everettii Merr. in Philip. Journ. Sci. III; 265, 1908.

Type is based on Forestry Bureau number 5591, collected by *H. D. Everett* on Negros Occidental in 1906. My field-note to this from Sibuyan island is:—A lax undershrub; stem terete, averaging at least 1 cm. thick and nearly 2 m. high; wood sappy white, with a large greenish pith, breaking with a snap, covered with smooth green bark; branches mostly toward the top, divaricate, unbranched, green; the soft membranous leaves spreading, with tips recurved, shining, pleasing green above, paler beneath; bracts of the axillary inflorescence foliaceous and similar in texture; odorless flowers the axils, the calyx greenish; corolla white, soft, tubular below the middle, inflated above, 5-segmented; the 5 stamens creamy white, inserted sessilely upon the throat of the inflated or rather the tubular portion; style similar in color; stigma dull brown; fruits light blue, sessile, 1.25 cm. long, nearly as wide across the truncate apex, tapering from base to apex,

soft and bladdery, without odor, containing 5 brown stony seeds. In fertile well drained soil of forests at 1000 feet.

Lasianthus obliquinervis Merr. in Philip. Journ. Sci. Suppl. I; 136, 1906.

Whitford 247 from mount Mariveles, May, 1905, is first cited of a number of them from the same locality. Very common in that locality, otherwise little known.

Lasianthus tashiroi Mats. in Tokyo Bot. Mag. XV; 37.

Rather widely distributed in our archipelago. The field-note to my Todaya plant is:—Lax undershrub; stem erect, terete, 1.25 cm. thick, dark green except for the brown excrescences; branches scattered, divaricate mostly toward the top, unbranched; wood also greenish and with a green pith. Leaves horizontal, flat, with recurved tips, chartaceous, much lighter and paler green beneath. Flowers ascending, calyx purplish white, the corolla snow white; fruits ellipsoid, 7.5 mm. long, azure blue, fetid. In or on a forested ridge at 6000 feet on mount Calelan. The Bagobo name is "Pa-mog-tiang."

LITOSANTHES Blm.

Litosanthes biflora Blm. Cat. Gew. Buitenzorg 21, 1823. *Merr.* in Philip. Journ. Sci. III; 326, 1909.

Very little collected, and extends from Mindoro across to the province of Sorsogon, Luzon. Recently the writer gathered it in the Cuernos mountains of south Negros and was distributed under number 9586.

SAPROSMA Blm.

Saprosma philippinense Elm. n. sp.

Erect shrub; stem 3 m. high, widely branched from below the middle, branches yellowish gray; wood pale white, easily breaking; bark thin, slightly checked, yellowish brown.

Leaves subwhorled, subchartaceous or submembranous, lucid green above, paler beneath, drying brown, diverse in size, oblong, entire, acuminately pointed, the larger blades 15 cm. long, nearly 5 cm. wide across the middle; base cuneate; nerves prominent beneath, the 5 to 7 lateral pairs ascending, cross bars quite evident, all more or less covered with short yellowish brown hairs; stipule 5 to 7.5 mm. long, spinescently dissected, puberulous toward the base, early falling; petiole 5 to 10 mm. long, also puberulous along the lower side. Peduncle usually solitary, glabrous, ascendingly recurved, axillary or from the fallen leaf axils, rarely with 3 peduncles from near the base, subtended by small stipular-like bracts, 3 cm. long, umbellately branched at the top; bracteoles subtending the green pedicels and umbels membranous laciniate and brown pubescent; pedicel 4 mm. long, glabrous; calyx subcampanulate, 5 mm. long, usually 5-dentate, also glabrous, nearly as broad across the top, thick, whitish and with a purplish base; corolla light creamy white, much softer in texture, glabrous except the villous throat, the broad tube 4.5 mm. long; segments 4, ovately oblong, obtuse at apex, thick, 3 mm. long, valvate, tips inflexed, with conspicuous inlaid margins more or less irregularly cut; stamens 4, inserted upon the throat, alternating with the segments; filaments very short, glabrous; anthers linear, 2 mm. long, inserted on the back toward the base; style as long as the corolla, glabrous toward the base, otherwise pubescent; stigma 2-lobed.

Type specimen 9222, *A. D. E. Elmer*, Lucban, Province of Tayabas, Luzon, May, 1907.

A fetish shrub in well drained soil of light woods at 2500 feet skirting the base of mount Banahao.

Resembling *S. ternatum Hook.* but leaves scarcely more than one half as large, bracts laciniately cut, flowers also larger and inflorescence always subumbellately branched from above the middle.

AMARACARPUS Blm.

Amaracarpus microphylla Miq. Ann. Mus. Bot. Lugd. Bat. IV; 211.

This fine species has not previously been reported from

the Philippines. It was collected in fertile soil of dense moist forests at 3500 feet south of the Baruring river at Todaya and was distributed under 10737:—Lax undershrub, 2 m. high; stem and branches greenish, quite rigid, the latter numerous and widely spreading horizontally. Leaves similarly spreading, lucid bright green above, much paler beneath, flat. Flowers axillary, ascending, 1 to 3-clustered, greenish white except the green calyx tips; the subtending bracts foliaceous. Rare and its Bagobo name is "Poagan."

MYRMEPHYTUM Becc.

Myrmephytum beccarii Elm. n. sp.

Myrmecophyte; tuber 3 to 5 dm. across, irregularly and shallowly lobed, grayish, more or less roughened, without spines, attached to its support by a number of flexible and twining roots from near the base, the inside turnip white and about as hard, honey-combed and inhabited by small black ants, the irregular lobes giving rise to few to several stems; stem 1 cm. thick at least, flexible, occasionally branched, frequently provided with soft spicules, grayish brown, smooth when fresh, wrinkled when dry. Leaves curved toward the ends of the stems and branches, thickly coriaceous, drying brown or nearly black, glabrous, obovately oblong or the smaller ones spatulate, the larger blades 1 dm. long, 4 cm. wide, margins entire, apex obtuse or rounded, base cuneate and decurrent along the 1 to 3 cm. long petiole; stipules brown, narrowly rim-like; nerves divaricate, faint, 7 to 9 on each side of the rather stout midvein, reticulations obscure. Inflorescence in sessile axillary clusters; outer involucral bracts 1 cm. long, thick, glabrous, grayish, irregularly divided nearly to the base into acute to acuminate segments; the inner smaller and more membranous bracts densely dark brown pubescent on the back; calyx 6 mm. long, the basal portion stipitate and densely covered with reddish brown setose hairs which soon fall off, 4 mm. wide across the top; rim 1 mm. wide, truncate, whitish, with reddish glandular dots, membranous; corolla at least 12 mm. long, the basal portion whitish, otherwise azure blue, glabrous except the woolly region on the inside of the

tube near the base, more or less thickened toward the throat; segments 6, the triangular acuminate points gradually recurved, the upper side with a retrose projection at the base of the thickened angular portion, nearly 7 mm. long; anthers 6, inserted upon the throat, alternating with the segments; glabrous filaments flat, 0.5 mm. long, nearly 3 mm. long, attached on the back a trifle below the middle; style glabrous, filiform except the enlarged apical portion which is either entire or with a few shallow stigmatic lobes; fruit ovoidly globose or ellipsoid, 1 cm. long, juicy, sweet, yellowish red, 6-seeded; seeds 3.5 mm. long, 2.5 mm. wide across the base, convex on the back, sides flat, base rounded, apex acutish.

Type specimen 11467,[a] *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910.

Several clusters of these were discovered upon shrubberies in a dry hot sand gravelly flat along the Pauala river at 750 feet. All were attached to within a few feet from the ground. Dedicated to the author of the genus, *Dr. Odoardo Beccari.*

This is the first addition to the hitherto monotypic genus founded upon the Celebese species, *M. selebicum Becc.*

HYDNOPHYTUM Jack.

Hydnophytum angustifolium Merr. in Philip. Journ. Sci. III; 162, 1908.

Based on *Mrs. Clemen's* specimens from lake Lanao, central Mindanao. Its range is mostly in the southern islands, although it is very common in the subalpine woods of Sibuyan. My specimens distributed under 12344 are typical, and the following notes are taken from the field label:— Epiphytic and shrubby, upon small stems and larger branches of trees; the honey-combed tuber is 5 dm. across, gray, smooth, more or less rugose or shallowly lobed; stems several, 3 to 5 dm. long, branched from near the base, terete, flexible, very smooth. Leaves ascending or horizontal, flat, slightly recurved, paler green beneath, quite brittle. Flowers in sessile axillary clusters; calyx pale green, the other parts white,

deciduous; fruit 7.5 mm. long, ellipsoid, bright orange red, juicy, sweet, with 2 flattened straw colored stony seeds.

Hydnophytum nitidum Merr. in Philip. Journ. Sci. II; 307, 1907.

Based on the author's number 6181, collected on mount Halcon, November, 1906.

Hydnophytum intermedium Elm. n. sp.

Epiphytic and insectivorous shrub; tubers irregularly rugose or obscurely lobed, smooth, grayish to brown; stems several, numerously branched, rigid, the older ones gray, the twigs brown, smooth, terete, tips ascendingly curved, 6 dm. long, the branchlets relatively short. Leaves flat, coriaceous, ascending, yellowish green, paler beneath, reddish brown in the dry state, glabrous, opposite, rather numerous along the branchlets, entire, sides slightly unequal, sessile, oblong to oblong spatulate, the average ones 5 cm. long, 1.5 cm. wide across the middle, apex broadly obtuse or rounded, base broadly cuneate; midvein very evident, the 3 lateral pairs ascendingly curved and more evident from the upper side; stipule very short, oblong, obtuse at apex, early falling. Flowers not seen; fruits usually, 3-clustered in the leaf axils, salmon red, ovoidly ellipsoid, 6 mm. long, shining, with the truncate calyx rim; pyrenes 2, plano-convex.

Type specimen 10782, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, May, 1909.

Upon tall trees of dense woods in a fertile humid basin at 3750 feet.

Intermediate between *H. nitidum Merr.* and *H. angustifolium* of the same author.

Hydnophytum mindanaensis Elm. n. sp.

An epiphytic myrmecophyte; tuber 4 dm. thick, rugose, smoothish, dull green, the inside honey-combed, channels brown, the vegetative portion whitish and about as hard as a potato; stems several, arising from the side of the tuber, the larger, ones 1 m. long, ascendingly spreading, very smooth, grayish

to brown, terete, only opposite, scattered, not numerous, thick, rigid, nearly flat, glabrous and smooth, diverse in size, elliptic to obovately oblong, the medium ones 7.5 cm. long, 4 cm. wide, obtuse at the apex, occasionally rounded to subcuneate, entire; petiole 5 mm. long although frequently shorter and occasionally longer; midvein evident, the 3 lateral ascending ones very obscure or not at all evident; stipule very short, rim-like. Flowers delicate, odorless, ascending, white, fascicled in the leaf axils; calyx elliptish globose, very smooth, 1.5 mm. across; corolla 3 mm. long at least, the adnate lobes splitting nearly to the base, glabrous except the few hairs at the throat; the 4 lobes ascendingly spreading, oblong, obtuse; stamens 4, inserted upon the throat, 1.5 mm. from the base; anthers subsessile, 1 mm. long, one half as wide, bifid at the base, basifixed; style 2 mm. long, barely lobed, also glabrous; green fruits ovoidly ellipsoid, with a much constricted neck and bearing the persistent calyx rim, nearly 7.5 mm. long; pyrenes 2, subplano-convex, 6 mm. long, 2.5 mm. at least wide across the middle, abruptly terminated by a sharp 1.5 mm. long point.

Type specimen 10874, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindano, June, 1909.

On the lower limbs of dry woods along a ridge of the Baracatan creek at 1500 feet. The Bagobos named it "Kapalkapal."

Differentiated from *H. philippinensis Becc.* by the larger and differently shaped leaves, smaller corolla and different seeds. The lobed anthers also throw it into relation with *H. moselayanum Becc.*

MYRMECODIA Jack.

Myrmecodia apoensis Elm. n. sp.

Epiphytic myrmecophytes; bulb oblongish ellipsoid, not lobed, 1.5 dm. across with only a single tuft of leaves at the distal or upper end, irregularly rugose, densely beset with echinate spines 7.5 mm. long, the inside honey-combed, the excavation wall smooth and yellowish, the vegetative

part whitish and as hard as a camote; stem 3 cm. thick including the spines, 3 to 5 cm. long, unbranched, densely and similarly echinate along the shoulders of the inflorescent grooves which alternate with 4 grooves of horizontal rows of leaves. Leaves ascending, flat, rigidly coriaceous, nearly alike green on both sides, quite ample especially toward the end, drying brown, the larger blades 1 dm. long, 3 cm. wide above the middle, glabrous, oblanceolate, rather abruptly acuminate at the apex, slenderly cuneate toward the base, the entire margins slightly involute in the dry state, arranged in 4 horizontal rows, leaving conspicuous scars after falling; midvein prominently raised on the lower surface, conspicuous clear to the apex, the oblique 4 to 6 lateral pairs very faint; petiole 1 cm. long or longer, stout, glabrous, grooved on the upper side; stipule dry, brown, nearly 1 cm. across, forming a sort of a circular plate to the base of the petioles, with an obtuse lobe on each side of the petiole above the middle, the sides and lower surface usually echinate. Flowers and fruits usually scattered in small groups along the bottom of 4 rather deeply channelled horizontal grooves alternating with the foliage rows; flowers white; fruits yellowish.

Type specimen 11261, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, August, 1909.

Upon the uppermost limbs of trees on a wind swept crest at 4000 feet in the range extending from mount Apo toward Santa Cruz and which the Bagobos call it "Burebid."

Most closely related to *M. antoinii Becc.* from Australia.

Myrmecodia sibuyanensis Elm. n. sp.

Insectivorous epiphytes; tuber grayish brown, shallowly lobed, nearly smooth, without spines, 3 to 5 dm. across, irregularly globose, honey-combed, the meat not hard; roots several, arising from the base of the bulb, flexible, terete, tightly wrapped about its support; stem usually solitary, arising from the uppermost end of the bulb, often as long as a man's arm and as thick as his wrist, unbranched, descendingly curved, with erect tips, rather soft in texture, easily breaking, quite bendable. Leaves rigidly coriaceous,

ascending, glabrous, arranged in 4 horizontal rows, leaving large scars after falling, the dry blades 1 dm. long or longer, 4 cm. wide above the middle, the entire margins minutely involute, obovately oblong, the apex with a short abrupt acute point, cuneate at base; midvein prominent, the 6 ascending lateral pairs faint; petiole also glabrous, channelled along the upper side, 5 cm. long; stipules forming rather thick plates, the upper side with 2 triangular acute nearly 1 cm. long lobes, the lower and lateral side spinescent. Flowers irregularly scattered along the base of rather deeply and squarely shouldered excavations alternating with the leaf rows; calyx surrounded by a deciduous involucre with dense dry brown hairs on the inner side, elongated ellipsoid, nearly 6 mm. long, 3 mm. thick, bearing a thin truncate rim; corolla white, 7.5 mm. long, thick, with 4 triangularly acute lobes, glabrous; stamens of an unequal number, sessilely inserted upon the throat; anthers oblong, 3 mm. long, biauriculate at the base; style slender, glabrous, slenderly clavate toward the apex: fruit ovoidly ellipsoid, smooth, dry, yellowish red, 7.5 mm. long, 8, concave on the back, plane on the inner 2 sides, broader below the middle, 4 mm. long, more or less clothed with fuzzy hairs.

Type specimen 12336, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910.

On limbs of rather large trees bordering the Pauala river from 750 to 1500 altitude. The writer observed that these insectivorous epiphytes more abundantly inhabit the trees partly leaning over the creek or river beds where a good current of air always waves; also on wind swept ridges, or in thinly wooded regions. They soon die and turn dry after being torn from their host, even so when cut with the limb attached.

Most nearly related to *M. tuberosa Jack.*, but amply distinct.

PAEDERIA Linn.

Paederia tomentosa Blm. Bijdr. 968, 1825.

Common from middle Luzon nortwards to the Batanes

island. Part of these I previously referred under *P. foetida Linn.*

Paederia verticillata Blm. l. c.

Mrs. Clemens collected several sheets of this in the lake Lanao region. The writer also collected it in the vicinity of mounts Banahao and Apo. The deep blood red flowers are very pretty!

TETRALOPHA Hook.

Tetralopha philippinensis Elm. n. sp.

Scandent, shrubby; stem 2.5 cm. thick, flexible, terete, crooked; branches crooked, interlaced and forming more or less tangled masses 10 m. or more from the ground, the free ends hanging, rather slender, green; wood soft, porous, dirty white; bark dull brown, mottled and smooth on the branches, on the stem very finely checked. Leaves coriaceous, glabrous, mostly horizontal, folded upon the velvety deep green upper surface, very much paler green beneath, recurved toward the acute or subacuminate apex, the entire margins slightly involute in the dry state, turning similarly black on both side while drying, opposite, scattered along the branchlets, becoming easily detached, base obtuse to acute, the larger blades 15 cm. long, 5 cm. wide just below the middle, mostly smaller, oblong lanceolate or elliptish; petiole also glabrous, usually twisted at the base, averaging 1 cm. long, stipule straw brown, thick, subpersistent, 2 mm. wide, the apex with a blunt tooth; nerves 5 to 7 on each side of the midvein, ascending, tips slightly arched and united, reticulations coarse, quite evident beneath, all glabrous. Flowers upon very short axillary cymes 3 to 5 mm. in length; calyx glabrous, 2.5 cm. long, equally as wide across the truncate top, gradually tapering from base to the rim; corolla deciduous, whitish, 8 mm. long, glabrous on the outside and the 2 mm. basal interior portion of the tube, the throat and the upper portion of the inner side of the tube with the upper side of the seg-

ments densely hairy; lobes 4 mm. long, strongly recurved, oblong, obtuse at apex, the tips on the upper side usually with few hairs and are rather roughened, 1.5 mm. wide, 4 in number; stamens 4, inserted upon the throat, erect and barely exerted; filaments glabrous, flattened, nearly 2 mm. long, alternating with the corolla segments; anthers as long, linear but widest at the base, straight, attached on the back below the middle, ends rounded; ovary 2-celled; style and fruits not known.

Type specimen 12563, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910.

A medium-sized tree climber in red compact soil of a forested ridge at 1250 feet. Rare! The local Visayan call it "Tagakong."

Our flowers are entirely too large for *T. motleyi Hook.* from Borneo. It also differs primarily from *Dr. Robinson's* Polillo specimen in having smaller flowers.

DAMNACANTHUS Gaertn.

Damnacanthus indicus Gaertn. Fruct. III, t. 182; 18, 1805. *Merr.* in Philip. Journ. Sci. III; 323, 1909.

Only known from mount Banahao in the Philippines.

PRISMATOMERIS Thw.

Prismatomeris tetrandra (Roxb.) K. Sch. in Naturlichen Pflanzenfamielien. *Coffea tetrandra Roxb.* in Fl. Brit. Ind. I; 538, 1832. *Merr.* in Philip. Journ. Sci. V; 243, 1910.

Several specimens of this have recently been collected in the province of Cagayan, Luzon.

MORINDA Linn.

Morinda philippinensis Elm. n. sp.

Scandent; stem nearly 2 cm. thick, terete, bendable, numerously branched toward the top; wood soft, porous, odorless, dis-

tinctly sweet, sappy white mixed with yellow, with quite a large brown pith; bark dull brown, minutely checked and with obscure excrescences, that on the branchlets smooth and mottled. Leaves coriaceous, mostly horizontal, folded upon the upper darker green surface, recurved and usually twisted or subfalcate toward the acute to acuminate apex, base obtuse or rounded, the larger blades 1 dm. long, 3.5 cm. wide across the middle or a trifle below it, ovately oblong to narrowly elliptic or the smaller ones lanceolate, glabrous, drying dark brown, the entire margins slightly wavy, opposite, scattered; petiole slender, glabrous, up to 1 cm. in length; nerves not prominent, 5 to 7, divaricate, their tips arched and united, glabrous; stipules a dry brown saucer-like rim 1 mm. high, ending in an abrupt point, persistent. Inflorescence nearly always terminal, usually only 1 but occasionally 2 or even 3 heads from the same end; peduncle slender, 2 to 5 cm. long, short dark brown pulverulent, becoming glabrate, erect, green; heads subglobose, 1.25 cm. across, several or more, numerously flowered; calyx 4 mm. long, nearly as wide across the truncate rim, the basal portion much narrowed, subglabrous; corolla tube 2 mm. long; segments thick, 4, nearly of the same pale green as the calyx, densely covered with whitish hairs on the upper side toward the throat, nearly 5 mm. long, 2.5 mm. wide, broadly lanceolate; stamens 4, barely exceeding the corolla; filaments slender, inserted around the base of the ovary disk, bearded on one side below the anthers; anthers oblong, 2 mm. long, dorsifixed; style included; fruits not known.

Type specimen 12460, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910.

Climbing upon and sprawling over thickets bordering the sand gravelly banks of the Pauala river at 750 feet. Called by the native Visayan "Comahiwan."

Differs from *M. umbellata Linn.* (*M. microcephala Bartl.*), in having fewer and larger heads upon twice as long peduncles; although the leaves are quite similar there are distinct floral differences. *Merrill's* specimen 576 from Culion island is referable here.

GALIUM Linn.

Galium philippinense Merr. in Philip. Journ. Sci. Suppl. I; 238, 1906.

This is based on *Elmer* 6557 from mount Santo Tomas, province of Benguet, Luzon, collected as early as June, 1904. In the first article of these Leaflets it was reported under *G. ciliare Hook.*

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LEAFLETS OF PHILIPPINE BOTANY

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GARCINIA FROM SIBUYAN ISLAND

BY

A. D. E. Elmer

—o—

Garcinia luzoniensis Merr.

Field-note for 12279:—A slender tree, on wet stony wooded banks of the Patoo river at 750 feet or higher; stem 10 inches thick, 30 feet high, branched from the middle; wood moderately hard, whitish, odorless, distinctly bitter; bark relatively thick, yellowish brown mottled with gray, smoothish or scaling in small plates, with a small amount of yellow viscid juice; branches widely spreading, numerously and laxly rebranched, the twigs ascendingly curved; leaves mostly horizontal, recurved especially toward the apex, thinly coriaceous, shallowly folded upon the upper much deeper green surface; young infrutescence terminal or axillary, ascending, solitary or 3 in a cluster, upon 0.5 inch long or less terete green stalks, subglobose, 0.5 inch in diameter, bearing sessile circular and brown stigmas, 2-celled, but frequently only a single seed develops, sticky.

Represented by numbers 12279 and 12145, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, April, 1910.

The leaves of the first number cited has the peculiarity of turning black while drying, no matter how favorable the dryers may be. The leaves of the last number cited remain green despite the fact that it is of the same age and

with young fruit. Possibly the latter number represents a different species. Both of *Dr. Whitford's* type numbers are also black.

Garcinia garciae Elm. n. sp.

Erect shrub; stem 5 cm. thick, 3 to 4 m. high, branched above the middle, rather crooked; branches divaricate, quite numerously rebranched, crooked and relatively rigid; twigs ascending, green, quite flexible, glabrous, greenish and angular in the dry state; wood yellowish white, odorless, somewhat bitter, moderately hard and tough; bark dull brown, minutely cracked, the inner layer light yellow and with scant similarly colored juice; bark reddish brown mixed with gray, smoothish, obscurely lenticelled or when old scaling in thin plates, yellow beneath the epidermis, the inside lighter yellow and exuding freely a similarily colored sticky juice. Leaves nearly similar green on both sides, copious, oppositely scattered along the twigs, glabrous, drying dull green, lanceolate or lanceolate oblong, easily breaking with a snap, flat, the slenderly acuminate tips somewhat recurved, base obtuse, the entire margins subinvolute in the dry state, the larger blades 7.5 cm. long, 2 cm. wide below the middle, finely papillate beneath and numerously pellucid glandular; midrib prominent beneath, with faint lateral ones; petiole 5 to 10 mm. long, more or less compressed. Flowers in small axillary clusters, upon very short greenish stalks provided with minute brown bracts; calyx reddish, glabrous, united at the base; sepals 4, the outer 2 ovately rounded and 1.5 mm. long, the inner pair obovately rounded and twice as large; petals red, mostly 3, veiny, rotund, at least 2 mm. long; the 3 or 4 stamens upon a short thick column, the style very short and bearing thick disk-like similarly colored anthers which dehisce circumcissilely; fruits not seen.

Type specimen 12429, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910.

Found in moist humus covered soil of a forested ridge at 2500 feet of mount Giting-giting. The native Visayan called it "Tacpo" which is also the vernacular name of a

common seacoast *Psychotria*. Number 14 collected by *Sr. Garcia* at Baler in 1902 is a good match and which the natives called "Calumbisan." Named after its first discoverer.

Closely resembling *G. urophylla Scort.* from Malay which however has more stamens in its flowers, and leaves with fewer lateral nerves besides not being glandular and punctate. Its section is *Hebradendron*, not previously known in our archipelago.

Garcinia binucao (Blco.) Chys.

Field-note:—A small slender tree, in red compact soil covered with humus, of forested ridges from 1000 to 3000; stem terete, 4 to 7 inches thick, 15 to 25 feet high; branches mainly toward the top, ample, divaricate, freely rebranched, the ultimate ones lax, suberect and relatively short; wood soft, sappy white, odorless, bitter; bark reddish brown mixed with gray, smoothish, obscurely lenticelled or when old scaling in thin plates, yellow beneath the epidermis, the inside lighter yellow and exuding freely a similarly colored sticky juice; leaves mainly horizontal or descending, coriaceous, dark green above, much lighter beneath, nearly flat. "Bagalot-de-pinta" is the vernacular Visayan name.

Represented by number 12561, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, May, 1910.

This species was repeatedly met in well drained soil of the subalpine forests, but not found in flower nor fruit. In the field it is easily recognized from the other species and I feel quite certain as to its name. It produces an abundance of latex which the natives gather for painting purposes and calking "bancas" their canoes hewn out of logs.

Garcinia rhizophoroides Elm. n. sp.

Erect tree; stem erect, at least 6 dm. thick, 12 m. high or higher, branched toward the top only, buttressed toward the base and with short thick prop-roots, terete, not straight; wood very soft, murky white or dirty so, tasteless and odorless; bark brownish, smoothish, 2 cm. thick, light

yellow beneath the epidermis, with similarly colored sticky juice; limbs relatively short, freely rebranched and forming a more or less dense crown; twigs also short, green, flexible, ascendingly curved. Leaves rigidly coriaceous, ascending, shallowly folded upon the upper deeper green and sublucid surface, margins entire and involute in the drv state, drying dull green, cuneate or alternate at the base, apex o tusely rounded or merely obtuse, blades 10 to 15 cm. long, 5 cm. wide across the middle or a trifle above it, with 20 to 25 very fine obscure lateral ascending pairs; petiole 2 cm. long, glabrous, the sides more or less angled. Pistillate flowers solitary or in small fascicles, chiefly in the old leaf axils along the twigs, rigid, easily breaking off, sessile; perianth 7.5 mm. long, the 4 segments united from above the middle into a fleshy columnar base; the outer pair thick, deep yellow when in flower, rotund, overarching the inner lighter yellow and smaller pair; ovary green, bearing a sessile watery white stigma which is not sticky; staminate flowers more numerously clustered upon subangular 5 mm. long pedicels, caducous, odorless, dull yellow; calyx of 4 persistent segments, nearly free to the base, forming a broad cup, 4 mm. long, broadly elliptic to subrotund, the outer pair somewhat larger, all more or less streaked with reddish brown, edges thin; petals free, deciduous, 3, a trifle longer than the calyx, ovately oblong, thinner in texture; stamens pale light yellow, upon short filaments, arranged in a globose mass and set upon a very short stalk, nearly 0.5 mm. across, obscurely flattened, 2-celled, the cells dehiscent along the edges; pistillode present; young fruit 1.25 cm. long, perfectly ellipsoid, hard, shining green, bearing a brown stigma, 6-celled and 6-seeded.

Type specimens 12528 and 12185, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May to April, 1910; also number 12538 from the same locality.

The former number the Visayan called "Bogayat" and was collected in densely wooded ravines at 1750 feet along the trail toward España. The latter was gathered in a mangrove swamp at 500 feet and was called "Barbatwan" by the same natives. It is quite common in deep moist soil

of woods in the lowland region and in red soil with a gravelly subsoil along wooded banks of streams. All of them have prop-roots extended from the shallow buttresses, strongly resembling certain species of *Rhizophoraceae.*

Garcinia vidalii Merr.

Field-note:—A small erect tree, in moist fertile flats or along the Pauala river at 500 feet, always in woods; stem 12 or more inches thick, 25 to 35 feet high, branched above the middle; wood moderately soft or hard, pale white, bitterish, odorless; bark brown, smoothish or shedding in small plates, whitish beneath the epidermis but as soon as exposed giving off a sticky light yellow juice; main branches divaricate, rebranched all along; leaves mostly clustered at the ends of the twigs, ascending, flat or the margins somewhat curved upon the lower much lighter green surface, the upper surface deep green and shining, thickly and rigidly coriaceous; infrutescence terminal, usually 2-clustered, upon 0.5 inch long green stalks; fruits clustered or rather pendulous, flattish globose, 3 inches across, greenish but yellow when mature, bearing a large dull brown stigma, about 12-seeded; young inflorescence white. The Visayan call it "Bogalot."

Represented by number 12183, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, April, 1910.

Quite common in somewhat swampy regions and along densely wooded banks of rivulets. The large yellow 3 to 4 inches thick fruits hang like apples beneath the dense dark green foliage and are very acrid and very purgative. Some trees are 45 feet high and 2.5 feet thick.

Garcinia linearifolia Elm. n. sp.

A very slender tree; stem 1 dm. thick, 7 m. high, branched above the middle; main branches divaricate, relatively long, ultimately laxly and numerously rebranched, the young portion glabrous and subterete; wood rather hard and heavy, reddish white, odorless and tasteless, the very thin sapwood white; bark deep or dull brown, smoothish

or obscurely checked, reddish brown beneath the epidermis, its juice is of a sticky light yellow color. Leaves glabrous, rigidly coriaceous, horizontal, flat, apical portion recurved, slightly paler beneath, linear oblong to lanceolate, gradually tapering from the middle to both ends, margins entire and somewhat curved upon the under side, oppositely scattered, apex blunt, blades 8 cm. long by 1 cm. wide across the middle; midrib prominent beneath, the lateral nerves very faint and scarcely visible; petiole 5 to 8 mm. long, glabrous. Flowers rigid, solitary or few-clustered in the leaf axils, sessile upon very short bracteate tubercles; calyx green, glabrous, nearly 4 mm. long, united about the base; segments 4, imbricate, ovately oblong, with hyaline margins; petals yellow or orange red, valvate, 6 mm. long, obovately oblong, also glabrous, thick, free nearly to the base, 4; stamens yellowish, about 20, united into a short column which is grown to the basal portion of the corolla, the erect free filamentous portion short and thick; anthers erect from the filaments, obscurely flattened, 1 mm. long, apex truncately rounded, dehiscent through pairs of slits along the edges; pistillode entirely absent; fruits not seen.

Type specimen 12196, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

Discovered in moist gravelly soil in a deep dark densely wooded cut along the Sinuban creek at 750 feet. Only one or two other trees were noticed along this same creek. The local Visayan call it "Tagbag."

Rather similar vegetatively to *G. garciae Elm.*, but the staminate flowers throw them into distantly related sections.

Garcinia dulcis (Roxb.) King

Field-note.—Strict and rather small trees in fertile soil of a forested flat at 750 feet; stem 8 inches thick, 30 feet high, terete, branched mainly at the top; branches divaricate, rigid, repeatedly branched; the twigs dark green, more or less angled and also horizontally spreading; crown flattish; leaves similarly spreading, diverse in size, rigidly chartaceous, flat, very dark green above, much lighter beneath; wood

moderately hard and bitter, odorless, yellowish; bark dull brown or mottled especially toward the top, roughened with numerous lenticels, yellowish beneath the epidermis, the inner side light yellow, with a viscid similarly colored juice; inflorescence clustered upon short green tubercles scattered along the branchlets; pedicels and calyx green; the rigid pedicels and 5 filamentous forks pale greenish or greenish white; anthers brown; the dwarfed ovary or stamineal glands pale yellow, more or less lacerated. The local Visayan call it "Bogalot."

Represented by number 12298, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, April, 1910.

Garcinia gitingensis Elm. n. sp.

A very slender tree; stem 8 to 14 cm. thick, 5 to 8 m. high, terete, branched toward the top only, not perfectly straight; branches relatively short, numerously and laxly rebranched, forming an elongated crown; the twigs green, glabrous, terete; wood whitish, moderately soft, odorless and tasteless; bark yellowish gray mottled, smooth, with but little yellowish sap. Leaves copious, opposite, glabrous drying dull green, elliptic, entire, at the apex abruptly running into a bluntly pointed caudate short or longer point, base abruptly acute or obtuse, the medium lamina 1 dm. long, nearly 4 cm. wide across the middle, coriaceous, horizontally spreading, slightly folded upon the upper side, paler green beneath; midrib conspicuous and brown beneath, with numerous fine lateral nerves; petiole dark brown when dry, less than 1 cm. long, glabrous. Flowers solitary in the leaf axils or along the twigs, or the staminate more numerous and upon tubercles; pistillate ones upon 5 mm. long glabrous pedicels subtended at the base by 1 to 3 pairs of decussately arranged minute bracts; calyx yellowish green, with 4 sepals, the outer 2 very small, the inner 2.5 mm. long and rotund; petals yellowish, 4, thinner in texture, equal in size and shape to the inner pair of sepals, all deeply concave on the upper side; stigma greenish, viscid, large, umbrella-shaped, upon a short thick stalk; stamens apparently wanting or in the bud state represented by a somewhat consolidated dark

green filamentous column on the outer side of which appear attached dark brown scales or vestiges of the anthers; fertile staminate flowers with similar perianths and a nearly equally sized pistil; stamens indefinite, grouped upon 4 spreading phlanges; anthers subsessile, subglobose, dehiscent through a slit across the top; mature fruit 4 cm. long, nearly 2.5 cm. across the middle, quadrangularly ellipsoid, with a sunken brown apex, yellowish, rather soft and sweet to taste, the pulp of the skin yellow not sticky, 2-celled, normally with 2 seeds only; seeds smooth, subrotund in outline, 2.5 cm. long, brown streaked with whitish laces, plane on the ventral side, convex on the dorsal.

Type specimens 12482 and 12526, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910; also number 12213 from the same locality.

It was always found to be a slender tree in red sticky though well drained soil of woods from 750 to 2500 feet. The Visayan call it "Batoohan."

Apparently this species was referred by *Mr. Merrill* under *G. eugeneafolia Wall.*, but *King* and *Gamble* write of *Wallich's* species:—"Fruits in fascicles of 2 to 4, globular, 0.75 inch in diameter, smooth, brown, crowned by the papillose stigma." There are also some vegetative differences.

Garcinia divis Pierre

Field-note:—A medium-sized erect tree, in moist alluvial soil along the Patoo river bottom at 750 feet in humid woods; stem 1 foot thick, terete, 35 feet high, branched above the middle; outside wood white, hard, heavy, odorless, very bitter; bark thick, lenticelled, grayish brown; stem upon subaerial roots or root-buttresses; branches widely spreading, freely rebranched, twigs dull green; leaves coriaceous, mostly horizontal, folded upon the upper much deeper green surface; flowers scattered in small groups along the branchlets, the pedicels and calyx green; filamentous phlanges 4, whitish, bearing numerous very pale yellow anthers; style also whitish; stigma viscid, yellow but turning deep red with age; flowers not odorous, and if the stigma

of a single flower comes in contact with a person's nose it will adhere to it.

Represented by number 12272, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, April, 1910.

It must be nearly typical, since the type was collected by *Cuming* on the island of Panay, an island in plain sight from the mountains of Sibuyan on clear days. Only one tree was observed.

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LEAFLETS OF PHILIPPINE BOTANY

EDITED BY A. D. E. ELMER, A. M.

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NOTES ON MYRISTICACEAE

BY

A. D. E. Elmer

—o—

GYMNACRANTHERA Warb.

Gymnacranthera negrosensis Elm. Leaf. Philip. Bot. II; 575, 1909.

Field-note:—A medium-sized tree, in moist compact soil of limestone rocks in densely wooded north hillsides toward the coast near Ipil; stem 1.5 foot thick, 35 feet high, branched toward the top; wood rather hard, whitish, its small vessels containing reddish fluid, without odor or taste; bark smoothish or scaling in plates, thick, with an abundance of similarly colored sap; branches widely scattering, slenderly rebranched, the ultimate ones green and with suberect tips; leaves horizontal or descending, folded upon the upper deeper green surface, tips recurved, glaucescently green beneath; flowers few, upon short stout green stalks, creamy yellow, quite rigid, the bud bracts brown. "Dugan" is the Visayan name.

Represented by number 12414, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, May, 1910.

It now appears to me more as a *Myristica*, yet I cannot see a reason for making the transfer. The young twigs and under surface of the leaves are grayish puberulent, other-

wise exactly as in the type. Again, it is closely allied to *M. cumingii Warb.* and *M. mindoroensis Merr.*, both from the island of Mindoro.

Gymnacranthera lanceolata Merr. in Philip. Journ. Sci. Suppl. I; 55, 1906.

Field-note for 11136:—A straight and erect tree, 30 feet high, in woods along a stream at 1000 feet; stem terete, 8 inches thick, branched toward the top only; wood moderately hard, without odor or taste or slightly bitter, whitish with reddish streaks; bark brown, mottled, minutely checked, reddish brown beneath the epidermis, quite juicy; branches numerously rebranched, forming a dense rounded crown; twigs somewhat drooping, slender, their ends green and suberect; leaves divaricate and descending, thinly coriaceous, margins wavy, conduplicate on the upper dull green or frequently subglaucescent surface, beneath yellowish brown especially the young ones, subglaucescent beneath; inflorescent suberect, green and densely covered witn rufous brown hairs; calyx yellowish, stamens creamy white.

Represented by number 11136, *Elmer*, Todaya (Mt. Apo), Mindanao, July, 1909; also 12537, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, May, 1910.

Gymnacranthera suluensis Warb. Monog. der Myrist. 373, 1897.

Field-note:—Stem 35 feet high and 8 inches thick, in woods along the Baracatan creek at 1500 feet; wood easily cutting and splitting, whitish, moderately hard, odorless and tasteless; bark mottled, smooth; the few main branches arising from below the middle, ascending, giving rise to many lax divaricate branchlets; leaves coriaceous, smooth on both sides, shallowly conduplicate on the upper surface, tips abruptly recurved, glaucous beneath, the principal veins yellowish; nuts lateral along the branchlets, ascending, upon thick erectly curved stalks, 0.5 inch across, nearly 1 inch long, olive green, surrounded by a red mass of a fleshy membrane. "Magolomog" is the Bagobo name.

Represented by number 10941, *Elmer*, Todaya (Mt. Apo), Mindanao, June, 1909.

The type is based on 3546 and 3561 collected by *Vidal* on the island of Basilan. It is doubtfully distinct from *G. paniculata* (*DC.*) *Warb.* and *G. zippeliana* (*Miq.*) *Warb.* of New Guinea. Our elongated fruits would place it under the latter name. Not having staminate flowers I cannot be definitely certain as to the genus even.

Gymnacranthera paniculata (DC.) Warb. Monog. der Myrist. 370, 1897. *Myristica paniculata DC.* in Ann. Sc. Nat. IV; t. 4, p. 31.

Field-note for 12138[a]:—Medium-sized trees, in a moist stone gravelly soil of wooded banks along the Pauala river at 1500 feet; stem 1.5 foot thick, 40 feet high, terete, branched from the middle; branches horizontally spreading, the ultimate ones numerous and lax, somewhat drooping; wood moderately hard, reddish, more or less burly, odorless, bitterish: bark smoothish, yellowish gray; leaves coriaceous, descending, shining deep green above, glaucous beneath, folded upon the upper side and with recurved tips; infrutescence lateral along the branchlets, in small groups upon 1 to 3 inches long sparingly branched stalks, greenish yellow, subglobose or short ellipsoid; nut covered with bright red meat sunken into its nutmeg-like grooves.

Represented by number 12138[a], *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, April, 1910; also number 12068 from the same locality.

The type specimen is based upon *Cuming* 901 from the province of Albay, Luzon. Our specimens are in fruit only and there is a possible chance of them being a *Knema*. Indeed their foliage has the exact shape and glaucous glabrous under side as *K. gitingensis Elm.*, but the lateral nerves are fewer and whose tips are not disconnected as in that species under number 12200 from the same locality. Possibly these are good *G. suluensis Warb.*, and my number 10941 determined as *Warburg's* Sulu plant may be true *G. zippeliana* (*Miq.*) *Warb.* Number 12068 has much larger fruits than 12138[a], bu otherwise they are identical.

Gymnacranthera cryptocaryoides Elm. n. sp.

Small erect tree; stem 2 dm. thick, 8 m. high, branched toward the top only; wood moderately hard, somewhat duller white in the center, without odor or taste; bark mottled, smoothish, reddish brown beneath the epidermis; branches divaricate, freely and laxly rebranched, the yellowish brown twigs suberect, the young apical portion fulvous puberulent. Leaves mainly horizontal, coriaceous or subchartaceous, flat or the sharply acuminate apex only recurved, deep sublucid green above, glaucescent beneath, alternatingly scattered along the branchlets, glabrous except the nerves beneath, narrowly oblong, 13 to 17 cm. long, 3 to 4 cm. wide across the middle region, margins entire and subinvolute when dry, base obtuse, in the dry state brown on the upper and grayish on the lower side; petiole 1 to 1.5 cm. long, similar in color and puberulence as the twigs, rugose when dry; midrib quite pronounced, yellowish, in the very young ones fulvous puverulent, at most with 13 ascendingly curved lateral pairs whose tips are obscurely united, reticulations are minute and obscure on both sides. Flowers not seen; fruits solitary or few-clustered from the leaf axils or in the axils of their scars, upon short yellowish brown stalks 5 to 10 mm. in length; pedicels as long, similar in color, pulverulent or puberulent; nuts short ellipsoid or subglobose, nearly 2.5 cm. long, yellow, pulverulent, bearing at the apex the subsessile nearly black bilobed stigmatic disk, creased especially along one side; the exocarp splitting open from the apex along the crease; seed brown, covered with a red integument which is dissected above the middle especially toward the apex.

Type specimen 12262, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

Discovered in fertile compact soil of woods along the Patoo river at 750 feet.

The vegetative characters alone distinguishes it from *Knema heterophylla (Vil.) Warb.*, an endemic and widely distributed Philippine species. It differs from the description of *K. vidalii Warb.* in always having less than 13 lateral nerves,

not 15 to 18 on a side, and whose tips are not arcuately united; neither do the young twigs turn to a reddish brown color nor are they at any time pubescent. The type of the former is from Guimaras island, of the latter from the island of Marinduque.

HORSFIELDIA Willd.

Horsfieldia ardisiaefolia (DC.) Warb. Monog. der Myrist. 274, 1897. *Myristica ardisiaefolia DC.* Ann. Sc. Nat. IV; t. 4, p. 34.

Field-note for 11337:—A medium-sized tree, in a moist alluvial flat of light woods along the Sinuban creek at about 500 feet; stem 1 foot thick, 20 feet high or higher, branched above the middle; wood rather soft, white, without odor or taste; bark gray, thinly checked longitudinally, that portion beneath the epidermis reddish brown; branches divaricate, slender, sparingly rebranched, the ultimate ones green and longitudinally 3-ridged; leaves horizontal or slightly recurved, more or less folded upon the upper shining green surface, much paler beneath, the midvein yellowish green, subchartaceous; inflorescence axillary, ascending, all the stalks green, the buds deep dull olive green; flowers subpendulous, slightly fragrant, lemon yellow, flattish, opening into 2 parts; anther in a flattened elongated column attached to the center; the fruits are 1.25 inch long by 0.75 inch thick a trifle below the middle, creased, orange red.

Represented by numbers 12337 staminate and 12067 in fruit, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, April and March, 1910.

Based upon 1702 *Cuming* from the island of Samar, and has a wide distribution in the Philippines.

Horsfieldia warburgiana Elm. n. sp.

Slender tree; stem 3 dm. thick, at least 10 m. high, terete, its branches mainly at the top, divaricately spreading, the glabrous brown colored branchlets horizontally spreading; wood dirty white on the outside, brownish toward the center,

moderately solid, odorless and tasteless; bark relatively thick, gray and brown mottled, shallowly checked, reddish brown beneath the epidermis and with a similarly colored juice. Leaves alternatingly scattered along the branchlets, ascending, more or less recurved toward the abruptly and sharply acute or acuminate tips, base short obtuse, coriaceous, lighter green beneath, glabrous, changing to a rich brown when dry, the medium blades 15 cm. long by 7 cm. wide across the middle, elliptic or oblongish, margins entire and subinvolute in the dry state; midrib raised beneath, with 7 to 11 oblique lateral pairs whose tips are strongly arched and faintly united, reticulations obscure and mostly toward the margin, all smooth or glabrous and dark reddish brown when dry; petiole glabrous, nearly black, 1 cm. long, caniculate along the upper side. Flowers not seen; infrutescence lateral; stalks 0.5 to 1 dm. long, sparingly branched from near the base, green, glabrous; fruits upon 5 to 8 mm. long pedicels, ellipsoid, 2.5 cm. long, pale yellow, creased especially along one side; exocarp splitting open along the crease, with a fetid oil; nut convoluted and covered with an orange red integument.

Type specimen 12297, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

Discovered in shallow black soil underlaid with a red compact subsoil in a forested flat at 750 feet. Named in honor of *Dr. Otto Warburg* who monographed the *Myristicaceae*. The Visayan call it "Lagase."

Not having staminate flowers there still remains some doubt at to the genus.

Myristica guatteriaefolia DC. in Ann. Sc. Nat. IV; t. 4, p. 20.

Field-note:—Tree 35 feet high, with a 1.5 foot thick stem, in moist alluvial soil of a wooded flat near the Patoo river at 750 feet; branches few, comparatively short and sparsely rebranched, divaricately spreading; wood moderately hard, dull reddish brown, odorless and tasteless; bark dull brown, scaling in thin plates, deep reddish brown beneath

the epidermis, with a similarly colored sap; twigs dull green, the younger portion covered with a cinnamon brown felt; leaves coriaceous, horizontal or descending, deep sublucid green on the upper shallowly folded side, beneath usually covered with a fulvous pulverulence, the veins yellowish green, tips recurved, margins or sides very coarsely wavy; fruits densely covered with a felt-like integument, ellipsoid, 2 inches long, nearly 1.5 inch across the middle, arranged along the branchlets and set upon 0.5 to 1.5 inch long rather thick and similarly covered stalks. "Dugad" is the local Visayan name.

Represented by number 12228, *Elmer*, Magallanes (Mt. Giting-giting), Sibuyan, April, 1910.

The type is based on *Cuming*, 1582 not 1585 as *Warburg* cites it, and was collected in the province of Batangas, Luzon. Known from nearly all the larger islands of the Philippines and from northern Borneo.

Myristica plumeriaefolia Elm. n. sp.

Slender tree, 10 m. high or higher, with a 3 dm. thick stem; main branches from the middle, forming an elongated crown, rather slender, not numerously rebranched; wood moderately hard and brittle, white with yellowish streaks, rather light, odorless and tasteless; bark smoothish or roughened with small lenticels, yellowish red beneath the epidermis and freely bleeding with a similarly colored juice. Leaves alternate, mostly toward the ends of the dark pulverulent twigs, heavy, very rigid, deep dull green and glabrous above, descending or the younger ones ascending, nearly flat, beneath grayish or copper brown pulverulent, the entire margins recurved in the dry brown state, oblong with the upper one more gradually tapering to an acuminate point, 2 to 4 dm. long, 10 to 15 cm. wide across the middle or a trifle below it, base rounded, bluntly obtuse; midrib thick and stout, glabrous, with 19 to 23 ascending and parallel lateral pairs, all more or less pulverulent along the sides and shallowly impressed on the upper side, reticulations evident after the pulverulence is rubbed off; petiole also glabrous, 6 mm. thick, 1.5 to 3 cm. long, blackish brown, deeply grooved

along the upper side. Staminate inflorescence dark fulvous puverulent or pubescent, axillary or lateral; main stalk scarcely longer than 5 mm. and nearly as thick, usually few-branched at the distal end, the flower bearing ends 6 mm. thick and provided with bract-like rims; pedicels similarly pubescent, 5 mm. long; perianth thick and rigid, yellowish on the inner glabrous side, fulvous pubescent on the outer side, 6 mm. long; the 3 oblongish segments united at the base and subtended by a broad bract; stamens 4 mm. long, gathered in a columnar cluster, the short thick stalk ciliate, the dark red connective exerted and terminated into a rounded point.

Type specimen 11063, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, July, 1909.

This beautiful nut-meg tree was collected in well drained porous soil of dry woods along the edge of the Baracatan creek ravine at 2000 feet. "Lago" is the Bagobo name.

Related to *M. philippinensis Lam.* (*M. bracteata longifolia DC.*) based on *Cuming* 829 from the province of Tayabas, Luzon, and 1481 from the island of Mindoro. Our specimens have relatively broader leaves and entirely different staminate inflorescence. Fruits on a near by tree were observed to be 5 cm. long and ellipsoid in shape. Again, our species can be recognized from *M. guattariaefolia DC.* by the different staminate inflorescence. It is quite distinct yet related to *M. mindanaensis Warb.*, collected at Taumu (Tauloma) a settlement between Davao and Daron.

KNEMA Lour.

Knema stenocarpa Warb. Monog. der Myrist. 577, 1897,

Field-note for 10990:—Slender erect tree, in dry fertile soil of a wooded ridge bordering the upper cogon formation and the Baracatan creek at 1500 feet; stem 3 inches thick, round, 15 feet high; branches from the middle, the main ones ascending, freely rebranched; wood moderately soft, without odor or taste, pale white; bark smooth, brown or mixed with gray blotches; leaves subcoriaceous, spreading, nearly flat, only the tips recurved, the edges more or less wand-

like, deep green above, glaucescent beneath, the main nerves yellowish green on the underside; flowers axillary; buds elongated; segments ascendingly spreading, brown as are the buds on the outside, red on the inner side; ovary brown, bearing a green stigma; fruit or nut ellipsoid, 0.5 inch long, yellowish brown. The Bagobo names are "Libago" and "Lago."

Represented by numbers 10990, 10960 and 11935, *Elmer*, Todaya (Mt. Apo), Mindanao, June and October, 1909.

The type is *Warburg* 13303, collected on Mindanao. The author declares it to have the identical foliage of *K. heterophylla* (*Vil.*) *Warb.*, but the fruits are much smaller and differently shaped. Still nearer it seems to be related to *K. cinerea* (*Poir.*) *Warb.* which was collected on Tawi-Tawi island at the southwestern extremity of the Sulu archipelago. Apparently this same species is common in the Lake Lanao region of central Mindanao and is also definitely known from the Zamboanga peninsula.

Knema gitingensis Elm. n. sp.

A slender erect tree; stem 15 cm. thick, 10 m. high, branched above the middle and forming an elongated crown; wood odorless and tasteless, dingy white, moderately hard; bark smoothish or scaling in thin irregular plates, dull brown or mottled, deep reddish brown beneath the epidermis, with a similarly colored sap; branches laxly rebranched, the ultimate ones green and somewhat drooping, entirely glabrous, very dark brown when dry. Leaves descending, coriaceous, deep shining green on the upper nearly flat surface, glaucous beneath even when dry, glabrous, alternatingly scattered along the branchlets, oblong, acute to slenderly acuminate at apex, short obtuse or subrounded at the base, entire, the larger blades 2 dm. long by 4.5 cm. wide across the middle; petiole 1.5 cm. long, glabrous, dark reddish brown when dry; midrib very conspicuous beneath, with 15 to 17 oblique lateral pairs, cross bars minute and very obscure, the main nerves entirely glabrous and yellowish. Flowers fascicled upon short relatively thick and bracteated tubercles; pedicels averaging 5 mm. long, strict, bibracteate at the middle, fulvous scurfy or stellately puberulent; the perianth segments united

below the middle, obovoid in the bud state, pale yellow on the outside, deep red on the inner, similar in vestiture as the pedicel; the 3 segments 4 mm. long, nearly as wide across the middle, bulgingly elliptic; stamineal disk deep red, 2.5 mm. across, distinctly glabrous, with 11 star-shaped lateral and rotately spreading appendages bearing short sessile stamens on their underside; anthers cream colored; fruits not seen.

Type specimen 12200, *A. D. E. Elmer*, Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910.

Found growing in well drained clayey red soil of a forested ridge at 1000 feet. "Anoling" is the local Visayan name.

This also has close affinities to *K. vidalii Warb.*, but the young twigs are at all times glabrous as well as the leaves with their nerves. The leaves of *Gymnacranthera cryptocaryoides Elm.* have from 3 to 5 fewer pairs of lateral nerves, twigs fulvous puberulent, never dark reddish brown in the dry state. Fruit on a near by tree was observed to be subglobose and at least 1.25 cm. thick, but whether it belongs to this genus I cannot say.

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LORANTHUS IN THE VICINITY OF MOUNT APO

BY

A. D. E. Elmer

—o—

Loranthus secundiflorus bolsteri Elm. n. var.

Branches yellowish gray; stalks of inflorescence yellowish green pulverulent; calyx short and thick, rim-like; corolla 5 mm. shorter than in the species, the red apical tip without the yellowish green basal portion; the anthers in our variety are 2 mm. shorter, distinctly bifid at the base, lanceolately linear rather than setaceously linear.

Field-note:—Epiphytic upon the upper limbs of rather large trees in humid forests at 4250 feet; the basal portion swollen, 0.5 foot thick, gray, comparatively little honey combed, inhabited by black ants; stems several or numerous from the same cluster, 7 to 11 feet long, freely rebranched; wood hard or tough, covered with smooth grayish brown bark; branchlets rather slender and flexible, somewhat drooping; leaves rigidly coriaceous, horizontal or descending, pale or yellowish green on both sides, flat or shallowly conduplicate on the upper side; inflorescence horizontal; stalks and calyx green except the purplish red margins of the latter; flowers arranged along the main axis in small groups of 3's, ascending, odorless, the basal one fourth of the corolla dark fiery red, otherwise greenish in the bud and turning yellow in flower; the 6 segments strongly reflexed, ultimately splitting clear down to the base; style greenish especially toward the stigma.

Type specimen 11701, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September, 1909.

Named with pleasure after *F. H. Bolster*, who found time besides his teaching work to collect a lot of interesting plants, a number of which are new to science. This species the Bagobos call "Manago."

Loranthus merrillii Elm. n. sp.

Small horizontally spreading clusters, scattered on all the branches of a medium-sized tree; stems terete and gray, twigs green and much flattened. Leaves coriaceous, oppositely spreading along the branchlets, dull green, glabrous, the bluntly acute or obtuse apex slightly recurved, the smaller ones lanceolate with subcuneate bases, the larger ones ovately oblong with rounded or obscurely cordate bases, sessile, the entire margins brown and subinvolute in the dry state, 9 cm. long and 4.5 cm. wide below the middle, frequently much smaller; midvein prominent beneath especially toward the base, with 5 to 8 faint lateral pairs, the reticulations more evident from the upper side. Inflorescence terminal or from the uppermost leaf axils; rachis averaging 5 cm. long, glabrous, horizontally spreading, occasionally more than one, very dark green; flowers in triads and arranged in 2 rows along the sides from below the middle, all sessile; common peduncle short, thick, very finely puberulent; calyx green, 4 mm. long, columnar, entirely truncate at apex, subtended by a short and thick bract, finely pulverulent; corolla erect, strict, with a yellowish zone below the blunt bud tips, otherwise bright red, 1.5 cm. long, ultimately 7-segmented clear to the base, the apical portion enlarged, otherwise tubular; the segments spatulately linear, 5 mm. long, strongly reflexed; filaments compressed, smooth, 2 mm. long; anthers brownish, with light yellow pollen, at least as long, linear, basifixed; style reddish, terminated by a brownish capitate stigma, terete, nearly equalling the stamens; ovary green; young fruits ellipsoid, dark green except the dull red persistent calyx vestiges.

Type specimen 10617, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, May, 1909.

This beautiful species was collected on a medium-sized

tree of *Eurya* on a densely forested ridge at 6000 feet of mount Calelan. Dedicated to *Mr. E. D. Merrill* who recently revised the Philippine *Loranthaceae* and published his monograph in the Philippine Journal of Science. The Bagobos call it "Manago."

Loranthus formicarium Elm. n. sp.

Rigid subparasitic shrubs; stem 5 to 8 dm. long, branched from near the base, several or numerous, at the base nearly 2 dm. thick, honey combed and inhabited by small black ants; twigs mostly gray or yellowish, brown lenticelled. Leaves oppositely scattered along the branchlets, glabrous, pale green on both sides, turning dull brown when dry, entire, subsessile, the smaller ones linearly oblong or lanceolately oblong, the larger ones ovately oblong, 1 dm. long by 4 cm. wide below the middle, base bluntly obtuse or broadly rounded and occasionally inequilateral, the apex characteristically rather broad and rounded; midvein evident from both sides, with 4 to 6 lateral ascending nerves on either side, their tips reticulately anastomosing; petiole very short, comparatively thick, leaving large scars after becoming detached. Inflorescence axillary; spike 3 to 5 cm. long, glabrous, divaricate or ascending, bearing 2 rows of triads along its sides above the middle; common peduncle very short, subtended by minute bracts which soon fall off; the 2 lateral flowers sessile, the middle one distinctly pedicelled, all subtended by a single quite thick bract 3 mm. long and rather sharply pointed; calyx 3 mm. long, columnar, the margins thin and subtruncate or obscurely dentate, subtended by 3 triangularly acute bracts; corolla 3 cm. long, glabrous, 6-segmented nearly to the base, the terminal reflexed segments linear and about 1 cm. long; filaments fleshy, glabrous, 6 mm. long; erect anthers light yellow, basifixed, 3 mm. long, narrowly linear; style terete, as long as the stamens, bearing a small greenish capitate stigma; apical portion of ovary conical, glabrous; fruits not seen.

Type specimen 11304, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, August, 1909.

On limbs of large trees in forests at 3000 feet. It is

not the only species with small more or less honey-combed tubers inhabited by ants. "Manago" is the native Bagobo name.

This can be distingished from *L. merrillii Elm.* by both the leaves and flowers.

Loranthus mindanaensis Merr.

Field-note for 11995:—Subparasitic, upon soft wooded medium-sized trees in jungles near the seacoast; stems several, branches more or less flexible and covered with smooth grayish bark; leaves rigidly coriaceous, similarly deep green on both sides, usually somewhat curved upon the upper side; inflorescence divaricate, odorless, all the stalks and calyx green; corolla tube deep yellow, the 6 reflexed segments glaucous green; the stigma and upper part of the yellow style of the same color; stamens yellow; the odorless flowers are erect and are grouped in 3's. The Bagobos call it "Manago."

Represented by number 11995, *Elmer*, Todaya (Mt. Apo), Mindanao, October, 1909; also number 11996.

The latter number was growing side by side with the former, either on the same or on different hosts, yet always as distinct plants. Its stems, branches and leaves are exactly alike; the arrangement and stalks of the inflorescence and size of the floral parts are also indentical. But the corolla tube instead of being yellow even in the bud state is always very dark purple red except the glaucous green apical portion whose very tip is again colored red. The type is *Dr. Copeland's* number 347 from Davao, who collected it on a species of *Antidesma* and on *Theobroma cacao Linn.*

Loranthus incarnatus Elm. n. sp.

Epiphytic and part parasitic, upon the upper limbs of lofty trees; stems 1.5 m. long, sparingly branched, occasionally creeping along their support; wood hard and rigid, bark mottled and smoothish; twigs rather slender, terete and very smooth. Leaves rigidly coriaceous, descending, alternating

ly scattered along the branchlets, the sharply acute or acuminate apices recurved and somewhat curved to one side, base obtusely rounded, dull green above, paler on lighter beneath, glabrous, turning grayish brown while curing, flat or only shallowly conduplicate, the margins entire but conspicuously wavy, lanceolate to ovately oblong, the normal blades 12 cm. long by 4 cm. wide a trifle below the middle, midrib raised beneath, with 4 to 7 ascendingly curved lateral pairs, reticulations obsolete, 5 to 8 mm. long, subterete except the groove along the upper side, leaving large circular scars after falling. Inflorescence pendulous, odorless, the numerous flowers crowded into dense fascicles, chiefly lateral; peduncle recurved, 1.5 to 2.5 cm. long, green, densely covered with a grayish brown pulverulence; secondary peduncles 3 mm. long, green and with a reddish tinge, similarly pulverulent, bearing 3 sessile flowers; calyx similar in vestiture, glaucously pink, 3.5 mm. long, 2.5 mm. wide across the truncate top, each subtended by a triangularly acute rigid bract, more or less angular or compressed; corolla glaucous pale pink or carnation red, 3.5 cm. long, tubular throughout, very finely pulverulent on the exterior, the lower side ultimately splitting open nearly to the base; the 4 or 5 segments reflexed, 6 mm. long, 2 mm. wide, ligulate, only their very tips yellowish green; filaments 4 mm. long, erect, pink except at the yellowish distal ends; anthers basifixed, yellow, linearly oblong, 3 mm. long; style pink, exceeding the stamens, persistent, ultimately becoming recurved through the slit of the corolla tube, bearing a small similarly colored capitate stigma; fruits not seen.

Type specimen 11817, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September, 1909.

This species was gathered in the densely humid forested basin at 4500 feet. Its glaucous carnation red flowers hang in dense clusters, which, with the dull green rigid leaves were quite ornamental. "Manago" is the native or Bagobo name.

It is very closely related to *L. malifolius Presl* and *L. curranii Merr.*, both with lateral and pendulous inflorescences. *L. haenkeanus Presl* with terminal and erect inflorescence is unknown to me.

Loranthus saccatus Elm. n. sp.

Epiphytic and part parasitic on limbs of medium-sized trees; stem hard, rigid, occasionally creeping along its support, terete, 2 cm. thick or less, at the base usually developed into 4 to 8 cm. thick tubers, few to several, 1 to 2 m. long; branches only sparingly rebranched, rigid and hard; twigs slender, terete, yellowish gray, covered with minute yellowish brown lenticels; wood without odor or taste, white; bark brown, smooth or minutely checked. Leaves rigidly coriaceous, horizontal or a trifle downwardly curved especially the slenderly acuminate or caudate apex, dark green above, paler beneath, glabrous, oppositely scattering along the branchlets, ovate or ovately oblong, varying in size, the larger ones 2 dm. long by 1 dm. wide toward the broadly rounded or shallowly cordate base, entire, drying greenish brown; midrib conspicuously raised on the under side, with 4 to 6 primary lateral nerves whose tips are reticulately united, the reticulations coarse and more evident from the upper surface in the dry state; petiole thick, averaging 1 cm. long, caniculate along the upper side. Inflorescence chiefly terminal or from the uppermost leaf axils; spikes yellowish green, spreading, lax, obscurely angular when dry, glabrous or yellowish brown scurfy below the middle, 1 dm. long in flower; common peduncles for the flowers less than 5 mm. long, glabrous, evenly scattered from below the middle, at the distal end bearing a single 4 mm. long ovately acute or acuminate bract; flowers erect, odorless, usually the sessile one fertile, the lateral or pedicelled ones sterile; calyx green, cylindric, 3 mm. long, with a thin minutely dentate or subtruncate top; corolla 2.5 cm. long, yellowish green or green at the clavate apex, the base conspicuously turgid or saccate, otherwise tubular, glabrous; segments more or less reflexed, 4 mm. long, ligulate, ultimately separating clear down to the bulbose base; filaments greenish, compressed, 3 mm. long, linearly oblong; style with the capitate stigma of the same color, terete, exceeding the stamens, subpersistent; fruits not seen.

Type specimen 11747, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September, 1909.

Collected on a *Litsea* tree in very humid densely forested flats at 4000 feet, south of the Baruring river. "Manago" is the Bagobo name.

Closely related to *L. ahernianus Merr.*, but the difference in leaves and flowers is sufficient for specific recognition.

Loranthus hexanthus Merr.

Field-note for 10462:—A large tangled shrub, parasitic upon a *Conocephalus;* wood snapping rigid; old bark gray and brown, young bark smooth and green; leaves heavy, thick, leathery, similarly green on both sides; inflorescence upon ascending green stalks, axillary; calyx greenish, when mature pinkish; buds deeper red toward their tips; corolla 5-segmented, the upper one third rotately spreading, ultimately splitting open clear to the base, paler red on the inner side, thick and quite rigid; filaments and style pale red, stigma deeper red; anthers light pink; fruit soft, yellowish red and becoming scurfy covered, containing a stony seed surrounded by sweet mucilaginous meat. On different hosts at 3000 feet. "Manago" is the vernacular Bagobo name.

Represented by number 10462, *Elmer*, Todaya (Mt. Apo), Mindanao, May, 1909; also numbers 11813 and 11854 from the same locality.

The type is from Lake Lanao, central Mindanao. Very common in the vicinity of Todaya in light woods or shrubberies and grows on a variety of trees and shrubs.

Loranthus apoensis Elm. n. sp.

A subparasitic shrub, upon limbs of medium-sized trees; stems numerous, 1 to 1.5 m. long, numerously branched and forming dense rounded masses, quite rigid, covered with brown more or less lenticelled bark, the twigs green and terete. Leaves ascending, deep olive green and shining on the upper side, paler green beneath, flat, thickly and rigidly coriaceous, breaking with a snap, usually somewhat twisted, turning blackish brown in the dry state, tips abruptly acute, base similarly obtuse, slightly inequilateral especially toward the base, subsessile, entire, opposite

at the thick nodes or places of branching, ovate to ovately oblong or subelliptic to merely oblong, 1 dm. long, only one half as wide across the middle or below it; petiole very short, glabrous, compressed; midrib barely visible, with 3 to 5 ascending obscure lateral pairs. Flowers in dense axillary fascicles crowded in between the leaves and branchlets, ascending, brick red or the apical portion more yellowish red, odorless, sessile, upon a ligneous base, subtended by rigid and glabrous bracts; calyx reddish, 5 mm. long, turbinate, the throat ultimately becoming lacerated; corolla fully 2.5 cm. long, tubular, 5-segmented nearly to the base; the spatulately linear segments 7.5 mm. long and spreading, not becoming strongly reflexed in anthesis; filaments 5, compressed, 4 mm. long; anthers linear, 1 mm. shorter, basifixed; style pale red below the middle, yellowish so above, terminated by a deep red capitate stigma; fruit ellipsoid, 7.5 mm. long, reddish, covered with brown scurfy lenticels, its meat soft and yellowish.

Type specimen 11454, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, August, 1909.

Discovered on medium-sized moss laden trees in damp wooded ravines at 7000 feet of mount Apo. It was frequently observed here but does not extend to lower elevations. "Manago" is the Bagobo name.

Allied to my *L. cuernosensis* from southern Negros.

Loranthus angulatus Elm. n. sp.

Small clusters upon the uppermost limbs of trees; stems grayish white, crookedly branched, rather bendable, arising from 3 to 8 cm. thick irregular bases; twigs strongly angled, the younger ones green, somewhat drooping but with ascending tips. Leaves smooth and glabrous, pale green on both sides, usually conduplicate on the upper side, diverse in size, copious, oppositely scattered along the branchlets every 2.5 cm. or less, turning blackish when dry and nearly always becoming detached, elliptic to oblong, the larger ones 1 dm. long by 5 cm. wide across the middle, thick and rigid, obtuse to subcuneate at the base, bluntly acute to obtusely rounded at the apex, entire; midrib conspicuous

beneath, with 4 to 7 ascendingly curved obscure lateral pairs, reticulations also obscure; petiole 5 to 8 mm. long, glabrous, 3-angled. Inflorescence erect, green except the yellow odorless flowers, axillary especially from the terminal leaf axils, glabrous; peduncles articulate, 6 to 10 mm. long, stout, strict, subtended by minute scale-like bracts, bearing usually sessile 3-flowered clusters at the distal end; each flower subtended by an obscurely 3-lobed cupular bract; calyx thick, 7 mm. long, tubularly turbinate, the rim thin, brown in the dry state, truncate or obscurely 6-toothed; corolla very fleshy, glabrous, yellow except the pair of fine red lines along the upper edges of the 6 segments, saccately tubular but ultimately becoming free nearly to the base, thickest below the middle; segments 4 mm. long, 2 mm. wide, rotately spreading, not strongly reflexed; filaments also fleshy, adnate clear to the base of the corolla segments, only 1 mm. free and erect, of the same color as the corolla; anthers red, 2 mm. long, basifixed, the blunt apex outwardly curved; style very short, glabrous, yellowish, with a green stigma; young fruit elongated ellipsoid, dark green.

Type specimen 10804, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, May, 1909.

Discovered on a species of *Grewia* in woods of a steep ravine along the Baruring river at 2750 feet. Its angular branchlets and inflorescence are very distinct from all other Philippine species. This as all others in this genus the Bagobos know as "Managο."

Loranthus banahaensis Elm.

Field-note:—Parasitic on limbs of a large oak tree, in dense forests at 4000 feet; clumps well scattered on most branches but rather of small size only; stems mostly few, grayish, nodulose, not rigid, sparingly branched; leaves flat, pale green, thin and leathery; inflorescence axillary, bursting from a large yellowish green rather thick protecting bract or hood-like cover; calyx green, sessile; corolla 0.75 inch long, cardinal red throughout, 6-segmented clear to the base, the narrow tips strongly reflexed; filaments adnate and similar in color; anthers erect, green; style also green, bearing a darker

green capitate stigma; mature fruits not seen. "Manago" is its Bagobo name.

Represented by number 10479, *Elmer*, Todaya (Mt. Apo), Mindanao, May, 1909.

Not typical, and was collected on *Quercus pruinosa Blm.* It is a question whether our species can be classed under the section *Lepiostegeres*, since the young inflorescence is subtended and surrounded by a single rather thick cone-like covering which bursts from the apex into irregular parts and usually falls off entirely before anthesis. This involucral covering is morphologically different from the numerouly imbricated true bracts. Possibly our species should form a new section.

Loranthus congestiflorus Merr.

Field-note:—Parasitic upon a *Eugenia* tree collected at 7500 feet of mount Calelan; stems comparatively few and sparingly rebranched, less than 0.5 inch thick, green, nodulose, 1 to 3 feet long; branches widely spreading, the ultimate ones subpendulous; leaves flat, thickly coriaceous, not rigid, olive green above, paler beneath; buds greenish yellow, 2 inches long, ellipsoid, strongly covered with imbricate scales; the involucral bracts turning yellow, deciduous, thick, spoon-shaped, with thin edges; odorless flowers crowded, greenish to yellow and utimately the lemon colored segments strongly reflexed; the inner base of the corolla and style dark crimson red, otherwise the style is of the same yellow color; stigma green. "Manago" is the native or Bagobo name.

Represented by number 10634, *Elmer*, Todaya (Mt. Apo), Mindanao, May, 1909.

This species was frequently observed in the mossy forests of mount Apo. It is a very fine distinct species with its greenish yellow flowers and has an entirely different involucre than *L. banahaensis Elm.* The type is Forestry Bureau number 5037 from the province of Benguet, Luzon.

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LEAFLETS OF PHILIPPINE BOTANY

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THE GENUS CANARIUM OF MOUNT APO

BY

A. D. E. Elmer

—o—

Canarium cumingii Engl.

Field-note:—Erect tree, 30 to 50 feet high, along wooded stream banks at 750 feet; stem 1 foot thick, crooked above the middle; branches ascending, ultimately crookedly and divaricately rebranched; bark grayish white, peeling in thin rather small and irregular plates; sapwood white, brownish toward the center, rather hard, without odor or taste; leaves horizontally spreading, the stalks and midvein yellowish green; leaflets strongly recurved, descending, rigidly chartaceous, shining bright green on the upper deeply conduplicate side, duller green beneath; infrutescence often 1 foot long and few branched at the base, axillary, pendulous, 6 to 10 inches long, all the stalks yellowish green; fruits teretely ellipsoid, less than 0.5 inch long, dark olive green. The Bagobos call it "Ogat."

Represented by number 11096, *Elmer*, Todaya (Mt. Apo), Mindanao, July, 1909.

Canarium racemosum Merr.

Field-note:—Slender erect tree, in forests at 3500 feet; stem 25 feet high, with an 8 inch thick bole branches rather few, spreading; the branchlets thick, quite long, suberect; bark smooth, grayish mottled; sapwood thin, white, otherwise some-

what red, moderately hard, odorless and tasteless; leaves horizontally spreading from the ends of the twigs, 2 to 3 feet long; leaflets shining on both sides, deeper green above, nerves beneath yellowish green, ascending from the thick petiole, flat and only a trifle recurved; infrutescenc axillary, pendulous, the stalk 6 to 12 inches long, brown pubescent; nuts green, hard, with a short brown pubescence which when fully mature falls or rubs off, ovoidly elliptic, obscurely 3-angular, nearly 1.5 inch long, 0.75 inch thick. The Bagobo specific name is "Ogat-somagasa."

Represented by number 10763, *Elmer*, Todaya (Mt. Apo), Mindanao, May, 1909.

Possibly it should be referred under *C. costulatum Elm.* for the stone is short and ovoid in outline instead of elongate ellipsoid. Its leaves are as in *Merrill's* plant.

Canarium gracile Engl.

Field-note for 10944:—Small tree, in dense woods along a steep slope of the Baracatan creek at 1750 feet altitude 5 inches thick; branches mostly above the middle, spreading, quite numerous; wood moderately hard, odorless and tasteless, white throughout; bark yellowish gray, longitudinally scaling in several layers of rather thin parchment-like plates; leaves alternatingly scattered along the twigs; the rachis thickened at the base, otherwise round and slender; leaflets recurved, nearly flat, deeper green above; inflorescence axillary, also green except the reddish corolla, shorter than the leaves; foliage and twigs when crushed with a strong turpentine odor. The flowering specimen was called by the Bagobos "Tumagasag", the fruiting "Bago."

Represented by numbers 10944 in flower and 11076 in fruit, *Elmer*, Todaya (Mt. Apo), Mindanao, June and July respectively, 1909.

Canarium clementis perumbrinum Elm. n. var.

Differs from the type in having fewer leaflets which are only one half as large, the lower ones especially the basal pair much more reduced in size, beneath rich and smoother

umber brown which color appears to be more permanent than in the type specimens. Petals obovately oblong rather than oblong ovate, obtusely rounded instead of acute or broadly acuminate; ovary finely ciliate on the apex; fruits not seen.

Field-note:—Strict tree 45 feet high, with a 2 feet thick stem; wood moderately hard, white at least on the outside, tasteless, with a faint *Canarium* odor; bark very smooth, mottled from bottom to top, pale red beneath the epidermis; main branches ascending, the ultimate ones erect and not numerous; leaves ascending, the tips somewhat recurved, rigidly coriaceous, descending, shallowly conduplicate on the upper shining bright deep green surface, alternate, mostly toward the apex of the brownish twigs, deep umber brown beneath; inflorescence greenish brown, ascending, axillary, bearing the small rigid flowers in sessile glomerules.

Type specimen 11730, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September, 1909.

Only one tree was found in fertile well drained soil of woods at 3500 feet, south of the Baruring river. This as most all others of the genus is known to the Bagobos as "Ogat."

Canarium melioides Elm. n. sp.

A tree, with a 13 m. high and 4.5 dm. thick stem; its branches toward the top, crookedly rebranched and forming a flat crown; the twigs suberect, rather short and with a strong turpentine odor; wood rather tough, white, tasteless, with a faint odor as that of the twigs, fine for working purposes; bark smooth, grayish white mottled. Leaves slightly ascending or horizontally spreading, alternate, at the ends of the lenticelled twigs only, glabrous, imparipinnate; leaflets 3 to 5, the terminal one largest and symmetric, chartaceous, descending, deep lucid green on the upper conduplicate surface, duller and much lighter green beneath, lead brown when dry, gradually tapering to the acute apex, the base of the lateral leaflets rounded, obtuse to acute in the terminal one, oblong or ovately oblong or the smallest ones elliptic, entire, 1 to 2.5 dm. long, 5 to 7 cm. wide across the middle or just below it, the lower portions usually inequilateral; the midrib

yellowish, conspicuous, with 7 to 9-arched and united lateral pairs, reticulations coarse and faint beneath; petiole terete, brownish when old, thickened and expanded at the base; petiolule 1 to 1.5 cm. long, the terminal one at least twice as long; stipule stout, 1 cm. long, flattened, gradually tapering from the base to the acute apex, glabrous, attached 5 or more mm. from the base of the stalk. Inflorescence erect, mostly terminal; the stalk green, more or less flattened, glabrous, flower bearing toward the top, varying from 3 to 7 cm. in length, always unbranched; flowers normally in small clusters of 3, rounded by rigid yellowish subglabrous and broadly rounded involucral bracts, upon 7 to 12 mm. long and divaricate stalks; sepals 3, free, rotund or orbicular, 4 mm. across, finely puberulent on both sides; petals of the same number, similarly puberulent on the outer exposed side, giving it a yellowish gray appearance, broadly oblong, 7 mm. long, obtusely rounded at apex; stamens 6, free; filaments glabrous, equal, 2.5 mm. long, tapering from base to apex, inserted upon the outer basal portion of the thick rugose and pubescent sterile ovary; anthers basifixed, oblong, 1.75 mm. long; fruits not seen.

Type specimen 11007, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, June, 1909.

This species was collected in damp though well drained soil of wooded ravines along the Baracatan creek at 1500 feet. The natives or Bagobos call it "Ogat-biau-an."

From *C. ovatum Engl.* or *Cuming* 604 it can be recognized notably by the fewer leaflets with different apices, and in not having a fulvous rachis, peduncles and involucral bracts. It seems *Dr. Perkins* in Frag. Fl. Philip. page 94 redescribed *Engler's* species under *C. pachyphyllum*. Her misconception of what *C. ovatum Engl.* really was is shown when she referred 2472 *Merrill* under it. In the field it reminded one of a *Meliaceous* tree.

Canarium costulatum Elm. n. sp.

A rather small tree; stem 10 m. high, 2.5 dm. thick; branches few toward the top only, sparingly rebranched; the ultimate ones 2.5 cm. thick, suberect, ferruginous; wood

odorless and tasteless, moderately hard, reddish toward the center; bark smooth, grayish mottled. Leaves horizontally spreading, mostly at the ends of the branchlets, alternate, 5 to 8 dm. long, odd pinnate or otherwise, leaflets 3 to 5 or even 7 pairs, quite rigid and chartaceous, the basal ones reduced, conduplicate on the upper dull green surface, much lighter green beneath, recurved toward the obtuse and abruptly recurved apex, entire, dull green in the dry state, brown pubescent on both sides especially the lower, oblong or the smaller blades subrotund, broadly rounded at the base, the average blade 2 dm. long and 7 cm. wide across the middle or below it; petiole and rachis dirty brown puberulent or hairy, the former thickened at the base, the latter more or less triangular; petiolule stout, similar in vestiture, 1 to 1.5 cm. long; stipule nearly obsolete or merely apiculate; midrib conspicuously raised beneath, hairy on both sides, the larger blades with 20 lateral pairs whose tips are arched and submarginally united, the cross bars and reticulations also conspicuous. Infrutescence ascending from the leaf axils mostly, unbranched, 1.5 to 2.5 dm. long, short and densely fulvous when young, wearing glabrous, fruit bearing mostly toward the somewhat recurved top; nuts ovoidly ellipsoid, 3 cm. long, 2 cm. wide below the middle, in the young state densely fulvous but soon becoming glabrate, deep purple when mature; stone ovoid, the main ridges terminating into sharp points at the apex and into a short stout base at the other end, each with a blunt ridge on each side; its 3 sides with a sharp median ridge and with a deep groove on each side, deeply concave at the base; flowers not seen.

Type specimen 11215, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, July, 1909.

Found on a wind swept forested ridge of mount Burebid at 3500 feet. Its particular Bagobo name is "Ogat-calawa." The purple red fruits are exceedingly pretty!

The leaves of this species are strikingly similar to those of *C. ahernianum Merr.*, *C. nervosum Elm.*, and to *C. leytense Elm.*, but the stone of the mature fruits are entirely different. In the last named it is of course much smaller and always glabrous, subterete and minutely rugose. The

fruits of the other three species are similar in the hull which in the younger stage of devolopment is covered with brown somewhat stinging hairs and are 3-angled. The sides of *Merrill's* species are plane, the ridges conspicuous and similarly curving from both ends. The sides of *C. nervosum Elm.* has a secondary ridge with 2 obscure lateral ones, and are deeply concave at the base, its main ridges are less pronounced and abruptly truncate at the base. The stone of *C. costulatum Elm.* is very different, not only from the species here discussed but also from all other Philippine species known to me except *C. racemosum Merr.*, from which it differs in the leaves as well as in the character of the fruits.

Canarium toncalingii Elm. n. sp.

A medium-sized tree; stem 4.5 dm. thick, 15 m. high, terete but rather crooked, branched chiefly at the top; branches rigid, crookedly branched and widely spreading, the slender suberect twigs 2 cm. thick; wood rather tough and hard, whitish, without odor or taste; bark smooth, grayish white. Leaves clustered at the ends of the brown twigs, radially spreading, 5 to 8 dm. long; leaflets 11 to 13, descending, very deep green and shining upon the upper slightly curved surface, chartaceous, lighter green beneath, the veins yellowish, drying dull green, oblong, the acute or acuminate tips recurved, base obtusely rounded, entire, 15 cm. long, nearly 5 cm. wide across the middle, the basal ones somewhat smaller; midrib conspicuous beneath and brown in the dry state, with about 17 lateral pairs whose tips are more or less united, the reticulations quite evident beneath; stipule setaceously acuminate, 8 mm. long, rufous puberulent but ultimately glabrous. Infrutescence axillary, varying up to 2.5 dm. long, spicate or the larger ones few branched, ascending, rufous brown, stout; nuts dark green, covered with a dirty yellowish gray pubescence, triangularly ellipsoid, equally tapering at both ends, at most 2.5 cm. long, 1.25 cm. thick across the middle, subtended by a thick persistent calyx 7 mm. across, upon short pedicels; flowers not seen.

Type specimen 10996, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, June, 1909.

Collected in compact fertile soil of woods bordering the upper limit of the cogon formation and the Baracatan creek at 1500 feet. The Bagobos know it as "Ogat-magasurud." Named after *Data Toncaling*, the Bagobo chief, who has done me numerous kind favors to help along my botanical explorations, besides offering me his house while I was working in his neighborhood.

It resembles somewhat *C. thyrsoideum Perk.*

Canarium apoense Elm. n. sp.

Slender tree, with a 4 dm. thick and 15 m. high stem; branches chiefly at the top, crookedly rebranched; wood whitish and reddish toward the center, moderately hard, burly, odorless and tasteless; bark smoothish, grayish mottled, reddish brown beneath the epidermis. Leaves rigidly chartaceous, glabrous, turning blackish while drying, alternate, only few at the ends of the suberect tips, ascending or the lower ones horizontal, shining green on the upper shallowly conduplicate surface, much paler green or yellowish so beneath, entire, the abruptly acute or acuminate tips recurved, base obtusely rounded and usually a trifle inequilateral, the lower ones smaller, usually with 9 leaflets, oblong or the terminal one obovately oblong, nearly 1 dm. long and 3.5 cm. wide; midrib prominent beneath, with 9 to 11 similarly prominent lateral pairs, reticulations fine and conspicuous; petiolule 5 mm. long, the terminal two to three times as long, smooth and brown as is also the rachis; stipule setaceously acuminate, 5 mm. long, glabrous. Inflorescent spikes 8 to 18 cm. long, axillary, ascending, dull green, entirely glabrous; calyx greenish, cup shaped, the rim roundly 3-lobed, about 3.5 mm. long, thick, subglabrous on the outside; corolla rigid, yellowish, oblong, 5 mm. long, the exposed outer side yellowish gray puberulent, apices rounded and with short incurved tips; stamens 6, all equal, free, inserted upon the base of the calyx and outside the rugose ovary; filament glabrous, flattened, widest at the base, 1.5 mm. long; anthers oblong, 2 mm. long, basifixed; fruits not seen.

Type specimen 11638, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September, 1909.

Repeatedly seen in a densely forested humid basin of moist fertile soil at 4000 feet, both north and south of the Baruring river. This the Bagobos simply call "Ogat."

Quite different from *C. lucidum Perk.*

Canarium laciniatum Elm. n. sp.

Tree, with a straight stem 12 m. high and 2.5 cm. thick; branches mainly toward the top, the branchlets sparingly rebranched and ascending, the twigs brown and containing latex; wood delicately white, moderately hard and light, without odor or taste; bark mottled, smoothish. Leaves alternatingly scattered, varying from 3 to 5 dm. long, imparipinnate, with 7 to 9 leaflets, ascending, glabrous, the basal pair smallest; leaflets divaricate and descendingly recurved, conduplicate on the upper deep and shining green surface, much paler beneath, greatly varying in size, the average blade 15 cm. long, fully 5 cm. wide across the middle, turning brown while curing, finely serrate except the basal one third, apex abruptly or gradually acute or acuminate, base inequilaterally short obtuse, oblong, the smaller ones ovately so or even elliptic, subchartaceous; midvein, conspicuous beneath, glabrous, with 6 to 16 lateral pairs whose tips archingly unite, yellowish, reticulations relatively conspicuous; rachis glabrous, stout, yellowish gray in the dry state; petiolule about 1 cm. long, scurfy, the terminal one longer; stipule about 2.5 cm. long, laciniately dissected, the short base finely scurfy, the segments striate and sharply pointed, finely puberulent. Inflorescence axillary, erect, 2 to 4 dm. long, very sparingly rebranched near the base; calyx green, rigid; corolla also rigid, creamy yellow; pistil of the same color, the ovary surrounded by a salmon colored rim; fruiting stalk thick, stout, more or less covered with a fine yellowish pulverulence toward its fruit bearing end; fruit ellipsoid, 1.75 cm. long, 1.25 cm. thick, soon wearing off, subtended by a 1 cm. wide persistent 3-lobed calyx, upon thick and 5 mm. long pedicels.

Type specimen 11122, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, July, 1909.

Discovered in dry woods at 1500 feet or about the upper

edge of the cogon formation. "Ogat" is the native Bagobo name.

Apparently distinct from *C. denticulatum Blm.*

Canarium sibulanense Elm. n. sp.

Strict tree; stem 10 m. high, 2 dm. thick; branches mainly toward the top and forming a rather dense crown; twigs brownish and with suberect tips; wood odorless and tasteless, reddish brown toward the center, moderately hard; old bark checked in small plates, that on the branches smooth and yellowish gray. Leaves 5 dm. long, ascending, imparipinnate; rachis finely puberulent along the upper side, with 5 to 7 pairs of leaflets; leaflets nearly flat, mostly descending, only the acute to acuminate tips recurved, sublucid on both sides, chartaceous, drying dull green, elongate oblong or ovately elongated, the basal pair much smaller, the terminal one largest and symmetric at the base, the lateral ones obtusely rounded and inequilateral at the base, margins entire, the largest ones nearly 2 dm. long, 3 cm. wide across the middle or toward the base, glabrous except the nerves beneath; midrib conspicuous beneath, brown, sparsely hairy; lateral nerves 13 to 23 on each side, oblique, relatively prominent, their tips interarched, reticulations coarse but quite evident, all more or less sparsely puberulent; petiolule 0.75 cm. long, terminal one 3 cm. long, ends somewhat thickened and in the young state ferruginous pubescent; stipule densely ferruginous, usually 3-forked from the base, the middle of the rather rigid setaceous segments 2 cm. long, the divergent lateral ones scarcely more than one half as long. Inflorescence from 2.5 dm. to nearly 6 dm. long, densely covered with a ferruginous pulverulence, interspersed with lighter colored hairs, ascending, axillary, paniculately branched from near the base, the secondary stalks very short, the larger branches subtended by stipular-like bracts, the upper ones very much reduced; flowers erect, few-clustered at the ends of the very short stalks, sessile, subtended by short triangularly acute bracts; calyx thick, green and covered with the same puberulence but usually mixed with more hairs, appressed canescent on the inner side, 5 mm. long or longer,

united below the middle, the 3 segments triangularly acute; corolla yellowish, 8 mm. long, the 3 petals yellowish, canescent on the outside, roundly obtuse, the margins glabrous and rather thin edged, oblong, slightly broadest above the middle; stamens 6, free, attached outside the disk; filaments glabrous, 2 mm. long, compressed, gradually tapering from base to apex; anthers 1.5 mm. long, linear oblong, basifixed, acute at apex; disk hairy on both sides, roundly 6-lobulate, the segments alternating with the strict stamens, at least 1 mm. deep; ovary short ovoid, hairy, gradually tapering into the short style which is also pubescent; stigma capitate, 1 mm. long, globose, obscurely 3-lobed or rugose, glabrous; infrutescence erect, brownish; nut nearly 2.5 cm. long, oblong in outline, 1 cm. thick, yellowish green and somewhat glaucous, erect, chiefly at the ends of the stalks, with a mucronate point.

Type specimen 11206, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, July, 1909.

A tree with a fine bole, inhabiting well drained soil of wooded ravines of streamlets near the Sibulan river at 1600 feet. The fruits were immature but apparently turn red when fully ripe. The Bagobos call it "Ogat-biau-an" and eat the fruits and use its resin for lighting purposes.

Related to *C. altissimum Blm.*, but very distinct from it.

Canarium ogat Elm. n. sp.

A slender tree; stem 10 m. high, 4.5 dm. thick, terete; main branches arising from the middle, the ultimate ones ascendingly spreading, the twigs suberect; wood moderately hard, reddish or brown toward the center, with a slight turpentine odor, tasteless; bark smooth and whitish, yellowish on the branchlets Leaves alternate, ascending, mostly at the ends of the twigs, 3 to 5 dm. long, glabrous; leaflets also ascending, rigidly chartaceous, folded upon the upper very bright and lucid green surface, paler green and sublucid beneath, the abrupt acute or acuminate tips strongly recurved, margins entire, oblong or elliptic, 7 to 9, the basal pair much smaller, obtusely rounded at the base, subchartaceous, quite variable in size, the medium blades 15 cm.

long and 5 cm. wide across the middle; nerves conspicuous beneath, especially the midrib, all glabrous and reddish brown in the dry state; the larger leaves with 11 to 15 lateral pairs whose tips strongly curve upwards; petiole glabrous, stout, 1 cm. long, the terminal one twice as long, dark brown when dry; stipule of a single segment, 5 mm. long, quite rigid. Inflorescence axillary, subglabrous, 2 to 5 dm. long, ascendingly curved, the longer ones sparingly branched toward the base, green; flowers odorless, rigid, yellowish, scattered in small sessile or shortly stalked glomerules; calyx 3 mm. long, united below the middle, subglabrous or only slightly hairy on the outside, the 3 segments rounded; petals 3, broadly oblong, about 5 mm. long, faintly cinereous on the dorsal side, rounded at the apex and with an incurved point; stamens free, varying from 6 to 9; filaments glabrous, flattened and widest at the base, 3 mm. long or less in some of the stamens of the same flower, inserted on the outside of the thick truncate and rugolose sterile ovary; anthers oblong, 1.25 mm. long, basifixed; dry fruits 2 cm. long, ellipsoid, without vestiges of hairs, subterete, subtended at the base by a persistent calyx 6 mm. across, upon short rather stout pedicels.

Type specimen 11859, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September, 1909.

Collected on Angat's knoll in dry fertile soil of grass land interspersed with light woods at 3750 feet. "Ogat" is the Bagobo name.

Related to *C. ahernii Merr.* and *C. nervosum Elm.*, but distinct from either.

Canarium todayense Elm. n. sp.

A slender tree; stem 15 m. high, 4.5 dm. thick; branches chiefly at the top, moderately short and congested; wood moderately hard, white or turning reddish toward the center, odorless, bitterish; bark smoothish, brown and gray mottled, densely lenticelled on the branchlets. Leaves alternate, mostly at the ends of the suberect twigs, nearly 1.5 dm. long, glabrous, drying brown, thinly coriaceous, conduplicate on the upper shining green surface, much paler beneath, the abruptly

acuminate or caudate apex recurved, base obtusely rounded and inequilateral, entire, subelliptic to oblong or ovately oblong, imparipinnate, the basal pair smaller, with 7 to 9 leaflets, the larger leaflets 7.5 cm. long by 3 cm. wide across the middle; petiolule of the lateral ones less than 5 mm. long, that of the terminal blade twice as long; midrib prominent beneath, brown, with 7 to 9 lateral pairs whose apical portions are strongly arched, reticulations rather fine and quite obscure. Infrutescence upon a green 8 to 18 cm. long spike, ascending, only occasionally short branched from near the base, glabrous; nuts 3 cm. long, triangularly in outline, 1.5 cm. thick toward the base in the dry state, short pedicelled, subtended by a small persistent calyx.

Type specimen 11268, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, August, 1909.

Collected in dry fertile soil of moist woodlands at 2750 feet. The Bagobos know it as "Ogat."

Very similar to *C. euryphyllum Perk.*, but leaflets thinner in texture, never obovate in outline, with fewer and much less prominent nerves, reticulations in ours nearly obsolete fruits also larger and differently shaped, and the flowers apparently are quite different.

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LEAFLETS OF PHILIPPINE BOTANY

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THE ERICACEAE OF MOUNT APO

BY

A. D. E. Elmer

—o—

The *Ericaceae* is a truly alpine family in the Philippines. Either as trees or shrubs they dwell among rocky outcroppings, along forested ridges and in the elfinwoods or in stony soil above timber line of some of our highest mountains. A goodly share of them have assumed epiphytic habits and love to dwell upon the uppermost limbs of the highest trees in densely forested flats or in straggling woods of wind swept ridges. In fact most of our Philippine species are epiphytes, and all four of our genera have representatives as such. Consequently most all of our species are shrubs, comparatively few are trees and only those at the highest elevations assume prostrate or trailing habits.

In the mount Apo region are at least twenty two species of *Ericaceae*, ten of which are new to botanical science. Out of the fifty species now known in our archipelago only two, *Vaccinium microphyllum Blm.* and *Gaultheria borneensis Stapf* are not endemic.

On Apo only the common *Gaultheria cumingiana Vid.* was found, yet *G. borneensis Stapf* has been collected in the mountainous region of middle northern Luzon. In this same region of Luzon are about a dozen species of *Vaccinium*. In the following list we definitely cite only ten, which however were gathered from a much smaller area than those

known from the northern island. Apo has six species of *Rhododendron*, all northern Luzon has one or two less. Mindoro and Luzon combined have two species of *Diplycosia*, mount Apo has five, four of which are in the following pages described as new.

The flowers of some of our species are very inconspicuous, yet most of them are showy and a few almost painfully so. For instance, take *Rhododendron spectabile Merr.* which is always an epiphytic shrub and is confined to the rain-mossy forests. When in full flowering state it appears as a flaming bush and presents a striking contrast to the mass of inconspicuously flowered and dark green vegetation. *Rhododendron kochii Stein* is a beautiful large and pure white flowered shrub or occasionally becoming tree-like, and is always strewn along streamlets of the mossy forests. Along the Seriban creek at Baclayan camp it vies with the showy rose red *Melastoma*, and both pleasingly adorn the otherwise somber moss laden vegetation. *Vaccinium palawanense Merr.* has not large flowers but their profusion eclipses all foliage, and are of a pure waxy red. On clear shining days especially during the bright mornings swarms of Hymenopterous insects feed on them. The terminal or younger leaves of this species are always reddish tinged while the young foliage is bright red. It therefore appears as red bushes across gulches and canyons and can be singled out from the rest of the vegetation at a long distance. The berries of *Vaccinium villarii Vid.* and *Vaccinium microphyllum Blm.* are edible. *Blume's* species has thin skinned bluish rather juicy and very sweet berries which are unfortunately never found in abundance. *Vidal's* species is common and is known from all the higher mountains and mountain ranges in the Philippines, and bears an abundance of fruit at nearly all seasons of the year. Its huckle-berries or blue-berries as one prefers to call them are much inferior in quality to the small leaved species. Over six years ago I collected it in the province of Benguet, Luzon, but nowhere have I seen them so abundant and of such large size as on the summit slopes of Apo where it forms the greater portion of the chaparral growth. On huckleberry peak at 9000 feet we found them exceedingly abundant in August. Some of the berries were nearly one half of

an inch in diameter. The shrubs grew in compact soil mixed with sand-stone, were no more than waist high and rigidly interlaced. Here the writer as well as the members of a military party, commanded by *Lieuts. W. H. Noble* and *Roderick Dew*, could pick and eat all the berries we desired in a small path. *Rhododendron copelandi Merr.* is usually a finely branched erect summit shrub with large balls of pure white faintly fragrant flowers. This same species however was noticed in the mossy forests to assume a climbing habit. A similar instance is *R. apoanum Stein.* This species is a common erect low shrub about the summit peaks of mount Apo, and which becomes a scandent rather lofty climber in the woods of mount Calelan. Again, *R. mindanaense Merr.* is a low rigid shrub on the rocky peaks of Apo, and in the elfinwoods of the summit of mount Calelan it assumed a subscandent habit.

GAULTHERIA Linn.

Gaultheria cumingiana Vid.

Field-note:—Small suffrutescent shrub, on moss covered tree trunks at 8500 feet on the summit of mount Calelan; stems tough, green below, red above, terete, branched, 3 feet long; leaves coriaceous, horizontal, with strongly recurved tips, shining deep green above, much lighter green beneath; inflorescent stalks divaricate, smooth, green or reddish on the exposed portions, pedicels descendingly recurved; young fruits greenish but soon turning bluish red. "Logauwoy" is the Bagobo name for it.

Represented by number 11678, *Elmer*, Todaya (Mt. Apo), Mindanao, September, 1909.

VACCINIUM Linn.

Vaccinium apoanum Merr.

Field-note:—An epiphytic shrub, on the upper rigid limbs of trees on a wind swept ridge at 3500 feet of mount Burebid; stems numerous from the same root cluster, ascending and interlaced, forming dense bushes, 6 feet high, the larger

ones 1.5 inch thick and freely rebranched, wood watery white, not hard, sweetish, odorless; bark brown, on the stems thinly checked, smooth on the more or less slender and numerous branchlets; leaves rigid, flat, ascending, paler green beneath; flowers deep flesh red, pendulous, upon strongly recurved green pedicels, odorless. The Bagobos call it "Tahima."

Represented by number 11258, *Elmer*, Todaya (Mt. Apo), Mindanao, August, 1909.

These specimens are typical and are always epiphytic shrubs, never trees 20 feet high with stems a foot thick.

Vaccinium villarii Vid.

Field-note:—Rigid and well interlaced shrubs, 1 to 2 m. high; wood hard, covered with brown bark; leaves rigid, similarly green on both sides, occasionally grayish green; flowers greenish white, pendulous; fruit blackish but frequently covered with a bloom. Common on all the summit peaks of mount Apo, extending down to timber line and forming the greater portion of the chaparral formation. It can at nearly all seasons be found in flower and with ripe berries. "Dungal" is the native or Bagobo name.

Represented by number 11392, *Elmer*, Todaya (Mt. Apo), Mindanao, August, 1909.

Exceedingly common and luxurient on Apo, but not at all noticed on mount Calelan. A widely distributed endemic species in all the alpine regions of the Philippines at least. It produces an abundance of edible fruits, popularly known as huckle-berry or blue-berry.

Vaccinium microphyllum Blm.

Field-note:—A creeping, dwarfed and rigid shrub, mostly in rock crevices all over the rocky summit of mount Apo above the timber line and in the chaparral; leaves rigid, shining green, much paler green beneath, densely clothing the ultimate branches; flowers subpendulous as are also the fruits; berries steel blue when ripe, ovoidly globose, covered with a thin skin, very juicy and possesses a fine sweet flavor. The Bagobos call it "Manalali."

Represented by species 11394, *Elmer*, Todaya (Mt. Apo), Mindanao, August, 1909.

The flowers of the above species are rather inconspicuous, greenish yellow or yellowish white, the fruits bluish. Those of my number 9540 from the summit of the Cuernos mountains of southern Negros are showy, shining vermillion red and its berries somewhat of the same color. The latter number was distributed under *V. mindorense Hemsl.*, because of *Merrill's* specimen from the topotype are noted as having red flowers. My specimen from mount Apo is a true *Vaccinium*, but not at all *V. microphyllum Blm.* in *King* et *Gamble's* Mat. Fl. Mal. Pen. n. XVI, p. 62 which description is that of a *Diplycosia*.

Vaccinium elegans Elm. n. sp.

Tree 10 m. high, 3 dm. thick or more; its main branches arising from below the middle, the branches horizontally spreading, the ultimate ones lax and numerous; wood hard, heavy, reddish toward the middle, odorless; the bark dark brown, coarsely shredded longitudinally, smooth and grayish on the branchlets, the twigs green and glabrous. Leaves horizontal and recurved, alternatingly scattered along the branchlets, thinly coriaceous, shining deep green above, much paler green beneath, the young terminal leaves reddish and pendulous, entire margins subinvolute in the dry state, glabrous, the lower surface brown and the upper side nearly black when dry, elliptic to lanceolate or oblongish, 5 cm. long, 2 cm. wide across the middle, acute but occasionally obtuse or cuneate, gradually tapering into the acuminate or caudate apex; petiole 3 mm. long, glabrous; midrib prominent beneath, grooved along the upper side; the lateral 4 to 6 pairs ascending, relatively faint, reticulations visible from both sides. Spicate racemes terminal or from the uppermost leaf axils, ascending, 3 to 5 cm. long, glabrous; pedicels less than 1 cm. long, divaricate, not numerous and scattering all along the rachis, glabrate or minutely glandular hairy, usually recurved; calyx glabrous except the finely ciliate margins, broadly cup shaped, 4 mm. across, with 5 blunt and callous tipped teeth; corolla

6 mm. long, broadly cylindric, whitish, constricted toward the apex, glabrous, with 5 small recurved segments, inserted upon the calyx below their teeth; stamens 8, inserted upon the base of the corolla; filaments 2.5 mm. long, widest and flattened toward the base, hairy; anther subauriculate and nearly basifixed, the upper incurved portion deeply cleft, with only short hairs, oblong, 1 mm. long; style smooth, striate, 5 mm. long, columnar, bearing a small terminal stigma; ovary inferior; fruit not seen.

Type specimen 11683, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September, 1909.

Discovered in dense woods or forests on a ridge at 6500 feet of mount Calelan.

Only one tree was found during the last month of my seven months' exploration work. An elegant species with lax branchlets, pleasing green foliage and waxy white flowers! "Mandalogong" is the vernacular Bagobo name.

Remotely resembling *V. hasseltii Miq.*, but the anther beaks are not at all as described in that species.

Vaccinium perrigidum Elm. n. sp.

An epiphytic shrub; stem usually few, branched all along, the larger ones 5 m. long; wood whitish, tough, covered with smooth grayish bark, brown on the branches. Leaves rigidly coriaceous, not numerous, alternatingly scattered, glabrous, horizontal or descending, sublucid on both sides, deep green above, paler so beneath, flat or shallowly conduplicate on the upper side, the acute or slenderly acuminate tips recurved, young leaves pale green, entire margins subinvolute in the dry state, oblong to elliptish, base rounded or short obtuse, the larger blades 1 dm. long by 4.5 cm. wide across the middle or immediately below it, turning brownish green while drying; petiole stout, also glabrous, reddish brown, nearly black when dry, 1 cm. long or longer; nerves equally pronounced on both sides, the midrib usually with 2 pairs of lateral ones arising from near the base and curvingly extending to the base of the tip, the 1 to 3 secondary lateral pairs rather obscure, reticulations evident. Inflorescence chiefly terminal or from the uppermost leaf axils,

spicately racemose; rachis smooth, more or less crooked, 5 to 8 cm. long, bearing scattered flowers along its entire length, ascending or divaricate; pedicels recurved, similarly green and shining, stout, 1 cm. long; calyx also green, flatly turbinate, 4 mm. high, 6 mm. across, glabrate except the finely ciliate margins of the 5 whitish and broadly rounded segments; corolla flask shaped, waxy white except the 5 small purplish reflexed segments, 12 mm. long, 8 mm. across the base, 2.5 mm. across the top, becoming detached from the calyx; stamens 10, inserted upon the base of the corolla; filaments white, widely expanded toward the base, hairy below the middle, 5 mm. long, slenderly tapering; anthers 2.5 mm. long, oblong with truncate or minutely lobed ends, the upper one half easily separating, dorsally attached, beaks entirely wanting, dehiscent through large special pores; ovary inferior; style 12 mm. long, glabrous, columnar, also whitish, bearing a terminal green stigma; fruits not seen.

Type specimen 11686, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September, 1909.

Collected from the lower limbs of large lofty trees on a forested ridge at 5500 feet of mount Calelan. A coarse and rigid plant in all its parts. The Bagobos call it "Basisir."

Vaccinium sylvaticum Elm. n. sp.

Epipytic and shrubby; stems ascending, several, 2 m. long, rebranched from near the base, moderately rigid, covered with smooth grayish mottled bark; twigs ascending, green, glabrous. Leaves also ascending, recurved toward the sharply acuminate apex, base attenuate, deep green and shining on the upper surface, much paler beneath, glabrous, drying brown especially the lower surface, coriaceous, oblong to elliptic with gradually tapering ends, entire and subinvolute in the dry state, less than 1 dm. long, 3 cm. across the middle, the smallest leaves oblanceolate; midrib prominent beneath, usually with 2 pairs of lateral ones arising from near the base, all more or less reticulately anastomosing, the reticulations more evident on the upper side at least in the dry leaves; petiole proper 5 mm. long, glabrous, dark brown. Spicate racemes ascending, terminal or from

the uppermost leaf axils, 5 to 8 cm. long, the rachis smooth and green; pedicels recurved, 7.5 mm. long, very finely puberulent, ultimately glabrous; calyx pendulous, cup shaped, 3 mm. high, at least as wide, green, puberulent, the 5 triangularly obtuse teeth purplish white; corolla inflated at the deep red base, 8 mm. long, gradually narrowed toward the small white neck, terminated by 5 ovately triangular 1 mm. long teeth, glabrous; stamens 10, inserted around the base of the corolla; filaments pink at the base, otherwise whitish, filiform, long hairy especially toward the slightly flattened base, 3.5 mm. long; anthers oblong with truncate ends, 1.5 mm. long, dorsally attached toward the base, the upper portion split and with large oblique pores, appendages obsolete; style glabrous, columnar, 8 mm. long, bearing a minutely pulverulent stigma; ovary inferior, with a yellow crown; mature fruit not seen.

Type specimen 11819, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September, 1909.

Clumps encircling medium sized tree trunks near the lower limbs of a sharply wooded ridge at 4250 feet along the Mainit creek. "Taupol" is the Bagobo name.

Its affinity lies with *V. malindangensis Merr.*, but entirely distinct from that species.

Vaccinium calelanum Elm. n. sp.

Epiphytic; stems usually several, 2 m. long, inclined to creep or sprawl, rigid, only sparingly branched, its gray bark usually checked, the twigs brownish and puberulent. Leaves alternate or indefinitely whorled at the basal portion of the relatively short and gnarly branchlets, ascending, rigid, with recurved acute or acuminate tips, shining deep green on the upper side, much paler green and sprinkled with glands on the lower surface, otherwise glabrous, rounded or subtruncate at the base, exceedingly variable in size, entire, characteristically brown in the dry state, the larger blades 8 dm. long and 4 cm. wide below the middle, frequently much smaller and occasionally larger, ovately oblong, the smaller ones distinctly ovate with a slender tip; petiole thick, dark brown, puberulent, 5 mm.

long; midrib conspicuous beneath especially toward the base, with 2 lateral pairs arising from near the base, the upper lateral pair stronger and curvingly arched clear into the apex, reticulations none. Inflorescence sessile, clustered, axillary; the subtending bracts large, rigid, imbricate, broadly rounded or rotund, the basal ones much reduced and subglabrous except the ciliate margins, the other short but densely ferruginous pubescent; bracteoles 2, subtending the pedicels or attached to them at the base, ovate in outline, 3 mm. long, the acute apex ciliate, the lateral margins brown winged; pedicels stout, at most 1 cm. long, glabrate, usually recurved; calyx glabrous, 5 mm. long or shorter, cupshaped, truncate at the base, more or less angular even in the dry state, dark green, bearing 5 short and broad teeth; buds short yellowish gray pubescent, oblong; corolla deep red, turbinate, 12.5 mm. long, with 5 short obtuse or longer and acute teeth, veiny; stamens 10, inserted upon the base of the corolla and falling with it; filaments flattened the whole length, 3 mm. long, glabrous or only sparsely strigose on the outer side toward the top; anthers beakless or with only very short ones, 4 mm. long, oblong, dorsally attached toward the base, the blunt basal portion inwardly curved, the upper one half divided, dehiscent through large longitudinal slits on the ventral side; style smooth, nearly 15 mm. long, terete, reddish, terminated by a small red stigma; ovary inferior; fruit not seen.

Type specimen 11345, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, August, 1909.

Collected on small trees scattered among interlaced shrubs in the mossy woods at 7750 feet of mount Calelan. The Bagobos call it "Calumping."

A critical segregate from *V. apoanum Merr.*, but leaves differently shaped, calyx distinctly toothed and with other minor floral characters. The ripe fruits for both of them are unknown.

Vaccinium medinilloides Elm. n. sp.

An epiphyte; stems several in the clump, 1.5 m. long, rigid, branched, 2 cm. thick, covered with smooth gray bark;

twigs greenish or brown in the dry state, the young portion finely sericeous, the slender free ends descending. Leaves very rigid, easily breaking with a snap, flat or the acuminate tips only recurved, darker green on the upper side, glabrous, dull green when dry, entire margins somewhat involute, the base of the larger ones rounded, obtuse in the others, ovately oblong or the smaller blades broadly lanceolate, 10 to 15 cm. long or much shorter, 3.5 to 5.5 cm. wide below the middle, alternatingly scattered along the branchlets; nerves conspicuous on both sides, the 3 lateral ones subparallel and arising from below the middle, the upper ones of these main lateral nerves arched and extending clear to the apex, reticulations visible from both sides but not conspicuous; petiole suberect, glabrous, stout, dark brown in the dry state, up to 7.5 mm. long, with a pair of large lateral glands above the middle. Flowers not seen; fruits in small fascicles, axillary or from the axils of fallen leaves; pedicels strict, glabrate, 5 mm. long, spreading, subtended at the base by minutely imbricated bracts; green fruit globose, glabrous, 5 mm. in diameter, bearing the persistent 5-toothed calyx, 5-celled and about 30-seeded; seeds obscurely trigonous, dark brown, 1.5 mm. long, minutely pitted and usually glistening.

Type specimen 11310, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, August, 1909.

Upon limbs of large trees in a humid forested basin, near the Baruring river at 4000 feet. It has the facies of *Medinilla*, and is called "Lumoos" by the Bagobos.

It falls under the same group with *V. apoanum Merr.* and *V. calelanum Elm.*, but is entirely distinct from either.

Vaccinium mearnsii Elm. n. sp.

Stunted tree; stem 4.5 cm. thick, 8 to 10 m. high, moss covered; branches rigid, widely spreading toward the top, the ultimate ones rather numerous; wood hard, reddish toward the center, burly, odorless and tasteless, the bark on the branches gray. Leaves rigidly coriaceous, flat or only the abruptly acute apex recurved, base cuneate, glabrous, alternatingly scattered along the smooth and green twigs, deep shining green on the upper side, paler beneath, drying brown

but not similarly brown on both sides, quite variable in size, the larger blades 8 cm. long by 3.5 cm. wide across the middle, elliptic or oblongish so, entire and subinvolute in the dry state at least; midrib conspicuous beneath, usually with only 2 pairs of lateral nerves arising from near the base, the upper pair curvingly extending nearly to the apex, reticulations obscure and less evident from the upper surface; petiole 5 mm. long, glabrous. Inflorescence spicate, chiefly terminal or from the uppermost leaf axils, 3 to 5 cm. long, suberect; rachis green, angular when dry, subtended at the base by short and broad imbricated bracts, in the flowering state finely puberulent; pedicels scattered divaricately all along, strict, also puberulent, 5 mm. long, stout, subtended by vestiges of bracts, articulate or jointed at the base; calyx also articulate, short turbinate, 3 mm. high, finely pubescent, subpendulous, with 5 rather small teeth; corolla crimson red, tapering from the more or less inflated base to the minutely 5-toothed apex, 7 mm. long, 3.5 mm. wide at the base, glabrous; stamens 10, inserted upon the corolla base; filaments sparsely hairy, a trifle wider at the base, nearly 4 mm. long; anther 1.5 mm. long, oblong with truncate ends, attached near the base on the back, the apex with oblique otherwise circular pores, cleft to the middle, without horns; style 5 mm. long, glabrous, terete, bearing a minute stigma; ovary subinferior; young fruit obovoidly globose, 7 mm. long, the small persistent calyx teeth lying flatly over the subtruncate apex; seeds reddish brown, oblong, compressed, smooth, 1.5 mm. in length.

Type specimen 11251, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, August, 1909.

A stocky tree on a moist forested ridge at 3250 feet of mount Burebid. Dedicated to *Maj. E. A. Mearns*, who has burned over the greater portion of the entire chaparral formation on the summit of mount Apo, according to the Bagobos, for the purpose of ensnaring mammals. The Bagobo name is "Mangolibas."

Distinct from its nearest Philippine ally, *V. alvarezii Merr.*

Vaccinium palawanense Merr.

Field-note for 11470:—Epiphytic shrub, 10 feet high,

on the main branches of lofty trees, or terrestrial and tree-like in humid woods of low moist flats at 6250 feet and in the shrubberies at a higher elevation on mount Apo; stem ascendingly branched, rigid; wood rather hard, whitish, closely grained, without odor or taste; bark brown, longitudinally checked, greenish black and smooth on the branches; leaves rigidly coriaceous, ascending, slightly recurved, very deep dull green or shining above, only shallowly conduplicate, much lighter or even yellowish green beneath, the young leaves reddish; rachis green or reddish on the upper exposed side; pedicels recurved, light green; calyx similar in color, the segments the color of the corolla which is of a very pretty waxy red; style and filaments whitish, anthers yellowish brown. This the Bagobos called "Cayaupang."

Represented by numbers 11470, 11390 and 11252, *Elmer*, Todaya (Mt. Apo), Mindanao, August, 1909.

All of these specimens vary somewhat from one another and none is typical of the type specimen collected by *Dr. Foxworthy* on mount Victoria of Palawan.

DIPLYCOSIA Blm.

Diplycosia baclayanensis Elm. n. sp.

An epiphytic shrub; stem 1 to 2 m. long, rigid, branched, the larger ones 2 to 3 cm. thick, ascending; wood greenish white, with a large pith; bark brown or grayish, smooth or becoming thinly shredded; twigs yellowish gray and smooth. Leaves thickly coriaceous, dull green above, much lighter beneath, ascending, the young ones reddish, flat, the entire margins rolled upon the under side in the dry state, alternatingly scattered or occasionally clustered in subwhorls, glabrous, minutely punctate beneath, ovately oblong, rounded or obscurely obtuse at the apex which is terminated by a very short mucronate point, base obtuse or rounded, the medium blades 7 cm. long and 4 cm. wide above the middle, drying brown; petiole 5 mm. long, also glabrous, stout, brown, deeply indented into the cortex of the branchlets; midrib conspicuous beneath, impressed on the upper side, with 2 to 4 lateral nerves on each side; the heavier pair

of lateral ones arising 5 to 10 mm. from the base and curvingly extending clear to the apex, reticulations absent on both sides. Flowers waxy white, pendulous, severally clustered from the leaf axils or axils of their scars; pedicels 8 mm. long, spreading, usually recurved, reddish and puberulent, quite slender, at the base subtended by small imbricated brown bracts; involucral disk 3 mm. across, only one half as high, glabrate except the finely pectinate more or less glandular margins; calyx 3.5 mm. long, subglabrous except the margins of the 5 teeth, greenish; corolla bluntly elliptish, white, 5 mm. long, glabrous, the short 5 teeth reflexed; stamens 10; filaments subcompressed, 2 mm. long, inserted upon the base of the corolla; anthers 1.5 mm. long, widest across the obscurely bilobed base, finely pulverulent or papillate, dorsally attached, without appendages although the apical portion is much narrower and thinner; the glabrous ovary globosely compressed, 2.25 mm. across, superior; style columnar, 3 mm. long, terminated by a minute stigma; fruit not seen.

Type specimen 11595, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, August, 1909.

Collected in a dense moss covered forested basin at 6500 feet at Baclayan or the upper camping place of mount Apo. It was taken from the lower limbs of a large tree. The Bagobo name is "Sigbut-ta-cayo."

Diplycosia apoense Elm. n. sp.

Epiphytes or sprawling over moss covered ground; stem 5 dm. long, branched; wood quite hard, covered with grayish brown bark; twigs provided with similarly colored setose hairs, the young portion densely covered with reddish brown hairs. Leaves alternate, copiously scattered along the branchlets, elliptic, 2.5 cm. long by 1.5 cm. wide across the middle, rigidly coriaceous, shining green on the upper side and beset with strigose hairs, beneath much paler green and duller, apiculately obtuse at apex, base rounded or obtuse, the entire margins curved upon the under side, curing brown, beneath setose hairy; nerves 3 from near the base, impressed on the upper side, the midrib rather conspicuous beneath clear to the apex; the lateral pair less conspicuous, subop-

posite, arising 1 to 3 mm. from the base, curvingly extending nearly to the apex, other nerves obsolete; petiole 3 mm. long, stout, similarly hairy. Flowers solitary or few clustered from the leaf axils; pedicels at most 5 mm. long, subrecurved, scurfy brown or with crisp hairs, subtended at the base by brown and minutely fringed imbricate bracts; involucral disk broadly bilobed, 3 mm. wide across the pectinately fringed margins, only one half as high; calyx 5 mm. long, 4 mm. across, rather broad clear to the base, glabrous except the pectinately fringed glands along the margins; segments triangularly acute, one half the length of the calyx; corolla glabrous, subcampanulate, with 5 acute or obtuse slightly reflexed teeth; stamens 10, inserted near the base of the corolla; the filaments glabrous, wider below the middle, 2 to 3 mm. long; anther without horns, 2 mm. long, finely pulverulent, widest across the minutely bilobed base, dorsally attached just below the middle; ovary also glabrous, subglobose, superior; style smooth, strict, a few mm. long; stigma terminal, minute; fruit not seen.

Type specimen 11676^{b}, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September, 1909.

Discovered in elfinwoods laden with mosses and scale-mosses at the summit of mount Calelan. This as well as *D. trinervia Elm.* were collected and cured under one number, namely 11676 which is nearest but not at all the typical *D. luzonica (Gray) Merr.* They can distinctly be separated at once even in the dry state. Number 11681, the type material of *D. calelanensis Elm.* is another very closely allied species.

Diplycosia trinervia Elm. n. sp.

An epiphytic shrub; stems quite rigid, branched; wood tough, covered with gray bark; twigs especially the younger portion brown when dry and covered with similarly colored setose hairs. Leaves copiously scattered along the branchlets, alternate, rigidly coriaceous, oblong elliptic, similarly tapering toward both acute ends, the apex terminated into a very short mucronate point, glabrous on the upper sublucid surface, paler green beneath, brown in the dry state, entire, mar-

gins subinvolute and with occasional bristle-like brown hairs, beneath glandular punctate or with few hairs along the nerves or from the glands, the average blades 5 cm long, 2.5 cm. wide across the middle, the smaller ones similar in shape; midrib conspicuous beneath, impressed above, usually with only 1 pair of lateral nerves suboppositely arising from 3 to 5 mm. from the base and curvingly extending clear to the apex, occasionally a minor pair arises from the base and runs along the margin, the upper oblique secondary nerves obscure or obsolete; petiole stout, 5 mm. long, brown, setose but ultimately glabrous. Flowers few clustered in the leaf axils, pendulous; pedicels slender, brown hairy, recurved, 1.25 cm. long or longer, subtended at the base by minute bracts; involucral disk 3 mm. wide across the rim, 1.5 mm. high, pectinately glandular along the margin, otherwise nearly glabrous; calyx greenish, 5 mm. long, tapering from base to the broad 5-dentate throat, similarly glandular along the edges, the teeth rather blunt; corolla glabrous, 7.5 mm. long, campanulate, the 5 short acute segments reflexed; stamens 10; filaments flattened toward the base, glabrous, 3.5 mm. long, inserted on the base of the corolla; anthers nearly as long, attached to the back below the middle, gradually tapering from the bilobed base to the sterile apical portion, minutely pulverulent, without appendages; ovary superior, flattish globose, glabrate, 2.5 mm. across; style also glabrous, 6 mm. long, columnar, bearing a terminal but not enlarged stigma; fruit not seen.

Type specimen 11676,[a] *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September, 1909.

This *Diplycosia* was collected in the elfinwoods on the summit of mount Calelan. See note under preceding.

Diplycosia calelanense Elm. n. sp.

A shrubby epiphyte; stems 1 m. long and branched; the main branches quite rigid, the ultimate ones rather lax and flexible, covered with smooth or thinly shredded yellowish gray bark; young twigs brownish in the dry state and sparsely setose hairy but soon becoming glabrous. Leaves alternatingly scattered, ascending, flat or only slightly recurv-

ed, rigidly coriaceous, deep shining green on the glabrous upper surface; much lighter or even yellowish green beneath, drying dull brown, quite variable in size, the larger blades 4 cm. long by 2 cm. wide a trifle above the middle, obovate or the smaller ones oblanceolate, the entire margins subinvolute and occasionally with few hairs, cuneate at the base, rounded at the other end and with a short mucronate point, beneath punctately glandular; midrib raised beneath, impressed above, usually with 3 lateral pairs; the basal pair arising a few mm. above the base and extending one half way of the blade, the middle pair more conspicuous and arched clear around to the apex, the upper pair obscure or obsolete; petiole glabrous or sparsely hairy, stout, not exceeding 5 mm. in length. Flowers in small axillary fascicles, subpendulous; pedicels 5 mm. long, subrecurved, provided with few crisp hairs, subtended at the base by short rather thick imbricate bracts; calyx green, subtended at the base by a saucer shaped and a glandularly margined rim 3 mm. wide, 5 mm. long, glabrate except the glandular margins of the triangularly shaped 5 teeth; corolla greenish yellow, short cylindric, 5 mm. long, nearly as wide, the 5 small recurved segments forming a truncate apex, glabrous; stamens 10, all equal and fertile; filaments also greenish, subcompressed, glabrate, 2 mm. long, inserted upon the inner basal portion of the corolla tube; anthers 1.5 mm. long, pulverulent, attached to the back below the middle, oblong and with truncate ends, slightly wider across the base, flattened toward and dehiscent at the apex, without appendages; ovary glabrous, superior, 2 mm. wide, 1.5 mm. high; style thick, 3 mm. long, fusiformly thickened at the middle, also glabrate and greenish; stigma terminal, not enlarged; fruit not seen.

Type specimen 11681, *A. D. E. Elmer*, Todaya (Mt. Apo), District of Davao, Mindanao, September, 1909.

Collected in elfinwoods densely clothed with mosses and scale-mosses at 8500 feet of mount Calelan. Called by the Bagobos "Limatmat."

Associated with other allied species of *Diplycosia*, but most closely related to the following.

Diplycosia luzonica (Gray) Merr.

Field-note:—Epiphytic shrub, upon the larger or lower limbs of trees at 8500 feet or near the summit of mount Calelan; stems 3 feet long, tough, branched especially above the middle, its bark smooth and brown; twigs chiefly ascending, brown or grayish, provided with brown hairs; leaves ascending, flat and only slightly recurved, shining dark green above, much paler beneath, the petiole and young foliage red; pedicels green or reddish, recurved; calyx green or the segment tips reddish brown; corolla 0.33 inch long, greenish, not tapering nor constricted toward the apex. "Sagumati" is the Bagobo name.

Represented by number 11676, *Elmer*, Todaya (Mt. Apo), Mindanao, September, 1909.

RHODODENDRON Linn.

Rhododendron copelandi Merr.

Field-note:—Erect and numerously branched 6 feet high shrub, associated with other shrubs along the Seriban creek at 7750 feet on Apo; leaves rigid, ascending, paler green beneath; flowers spreading, rather numerous and forming pure white and somewhat fragrant clusters. This delicately pretty species the Bagobos call "Malambago."

Represented by number 11395, *Elmer*, Todaya (Mt. Apo), Mindanao, August, 1909.

Rhododendron kochii Stein

Field-note:—Tree-like shrub along the Seriban creek at 6500 feet of mount Apo, in dense woods of moss covered soil; stem 3 to 6 inches thick, 10 to 20 feet high, usually inclining; branches ascending, rather numerously and laxly rebranched; wood soft, reddish white toward the center, without odor or taste; bark brown, smoothish; leaves in whorls, ascendingly recurved from the reddish petioles, rigidly coriaceous, dark sublucid green above, much paler or yellowish green beneath; pedicels reddish; flowers white, odorless, as-

cendingly spreading, white; filaments whitish; anthers brownish; style and stigma greenish. "Malagus" is the name given to it by the Bagobos. If I remember correctly the natives also called the large white flowered *Drimys piperita Hook.* by the same name. One must admit casual similarity in the two species representing widely different families.

Represented by number 11435, *Elmer*, Todaya (Mt. Apo), Mindanao, August, 1909.

Rhododendron mindanaense Merr.

Field-note:—A stunted erect shrub, 3 feet high, scattered with other dwarfed shrubs about the summit of mount Apo at 9950 feet; stems erect, few to several, sparingly branched; leaves rigidly coriaceous, copiously arranged in subwhorls, ascending, paler green beneath; flowers pure white, rather large and showy, ascendingly scattered. The Bagobos call it "Malagus." See note under the preceding.

Represented by number 11383, *Elmer*, Todaya (Mt. Apo), Mindanao, August, 1909.

Rhododendron quadrasianum Vid.

Field-note:—A stocky tree in a dense moss covered forested basin of Apo at 6500 feet near Baclayan, a cold and alpine camping place; wood hard and reddish toward the center, covered with brown shredded bark; leaves suberect, numerous, shining bright green above, much paler and punctate beneath; flowers not numerous, bright blood red, pendulous, 0.5 inch long or longer, cylindric. "Tongog" is the Bagobo name.

Represented by number 11656, *Elmer*, Todaya (Mt. Apo), Mindanao, September, 1909.

Rhododendron spectabile Merr.

Field-note:—An epiphyte in moss covered dry woods on a ridge 7500 feet of mount Calelan; stems few, spreading, subdeflexed, the tips suberect and green; twigs rather gnarly, ashy gray; leaves thickly coriaceous, dull dark green on the upper

side, gradually recurved, much lighter green and punctate beneath; flowers divaricate, not numerously clustered, very showy, odorless; pedicels thick, terete, ascending, reddish; corolla heavy and somewhat fleshy, 2 to 3 inches long, purple red, the rotate lobes as widely spreading as the flower is long; stamens and pistil pale red; ovary glabrous, reddish brown; anthers creamy yellow. "Malagas" is the native Bagobo name.

Represented by number 10631, *Elmer*, Todaya (Mt. Apo), Mindanao, May, 1909.

Rhododendron apoanum Stein

Field-note for 11386:—An erect shrub, 3 feet high; stem usually several, numerously branched above the middle; the suberect twigs grayish brown; leaves numerous, ascending, grayish brown beneath or the young ones scurfy brown on both sides; flowers terminal or upon short special stalks, quite numerous and forming dense blood red cluster; corolla broadly cylindric, 0.75 inch long, upon glandularly scurfy pedicels. This the Bagobos call "Calumping-busau."

Represented by numbers 11386 and 10630, *Elmer*, Todaya (Mt. Apo), Mindanao, August and May, 1909.

The former number is typical *R. apoanum Stein*. The latter number was collected on a wooded ridge at 7500 feet of mount Calelan, and had a subscandent epiphytic habit. *Stein's* species came from the chaparral region of Apo, since none of the former botanists have explored mount Calelan. Number 10630 is somewhat similar to *R. nortonae Merr.* which the writer also collected in southern Negros.

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LEAFLETS OF PHILIPPINE BOTANY

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SOME PHILIPPINE PANDANACEAE

BY

Count Prof. U. Martelli

(*Florence, Italy*)

—o—

Two years ago I published a critical review of the Philippine *Pandanus*, and last July another study of the Philippine *Freycinetia*. In the preface of this last article, I expressed the opinion that a greater number of species of *Pandanaceae* till now unknown, might yet be discovered in the great and unexplored forests of the Philippine Islands. Nevertheless I should never have thought that after so short a time it should be necessary to add so many novelties, all recently collected by *Mr. Elmer* on the island of Sibuyan and in the Mt. Apo region of Mindanao. And indeed as many as twenty four species under three genera of *Pandanaceae* have been collected during his herborizations on those two islands alone,—thirteen *Pandanus*, ten *Freycinetia* and one *Sararanga*. Of these, seven species of *Pandanus* and five of *Freycinetia* are apparently till now undescribed; the other species, although already known, are no less interesting for their geographical distribution. In consequence of these additions there are at present known 30 *Pandanus*, 42 *Freycinetia* and 1 *Sararanga* from the Philippine Archipelago.

I beg to express my congratulations to *Mr. Elmer* for his activity in exploring the Philippine flora and at the same time I wish to tender him my cordial thanks for his kindness in supplying my own herbarium with very fine and large specimens of these plants put up in bundles, and which have enabled me to give almost complete descriptions of the new species.

SARARANGA

Sararanga philippinensis Merr. in Gov't. Lab. Publ. n. XXIX, 5.

Habitat:—In moist sand gravelly soil of the Patoo river at 200 m. (750 feet). Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910. *Elmer* Philip. pl. n. 12230. (Herb. *Martelli*).

Solitary trees; stem terete, without proproots, strict, nearly 25 feet high, 8 inches thick, few branched only at the top; wood dull white, pulpy, harder on the outside; bark yellowish, smooth except for the blunt spines or wart-like excrescences; branches three, ascending, unbranched, 3 to 5 feet long, 3 to 5 inches thick, obscurely ringed; leaves clustered at the top, ascending, the apical one third strongly recurved or hanging, 5 to 8 feet long, nearly 3 inches wide, deeply conduplicate on the upper side especially so toward the base where it is abruptly expanded, sharply serrate on the margins and along the median line beneath toward the apex, similarly green on both sides; infrutescence terminal, upon a recurved pendulous peduncle, 2 to 3 feet long, 1 to 2 inches thick, subterete, yellowish green; panicle terete in outline, lance shaped, 3 to 5 feet long, 1 foot across the widest portion; branches 6 to 10 inches long, descending, copiously rebranched from the base, all the stalks yellowish green; calyx similarly green; fruits green, yellow and finally candy red when mature, more or less curved and laterally triangular in shape, with flattish seeds and sweetish juice. (*Elmer* ms.)

Indigenous name "Baga-as".

FREYCINETIA

Sectio; **Oligostigma**

1*. **Freycinetia maxima Merr.** in Philip. Journ. Sci. III, 310.

Habitat:—In woods of moist fertile soil along the Pauala river at 200 m. (750 feet). Magallanes. (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, March, 1910. *Elmer*. Philip. pl. n. 12114. (Herb. *Martelli*).

Stem 1 inch thick, only sparingly branched, climbing along a tree trunk for 15 to 25 feet high; old stems obliquely ringed every inch or so, the soft fibrous white wood covered with smooth yellowish gray bark; leaves scattered in rows all along, horizontal, gracefully recurved, gradually twisted from base to apex, deeply grooved on the upper side below the middle, shining deep green above, much paler beneath, the basal portion provided with a dark purple 1 inch wide and 3 inches long pair of stipules, heavy, thickly coriaceous; infrutescence terminal, upon a 6 inches long subrecurved peduncle, the pedicels only an inch or two long; spikes 3, subterete and often wavy or rugose, 6 to 9 inches long, 2 to 3 inches thick; seeds maturing from the apex toward the base, deep red except the brown stigma, of a fermented wine odor. (*Elmer* ms.)

3[a] **Freycinetia apoensis Martelli** sp. nova

Folia in corona ad apicem ramorum conferta imbricata, subcoriacea, basin versus crassiora, 60-70 cent. longa, 3-3. 5 cent. lata, anguste, elongato-lanceolata, utrinque sensim et longe attenuata, apice attenuato-acuminata, basin versus longe canaliculata, utrinque crebre et conspicue longitudinaliter venosa, subtus, praecipue prope basin, saepius tesselata et sublaevia; auriculis membranaceis, minime scariosis, cito marcescentibus et in fibras solutis, amplis, 5 cent. longis, basi 2 cent. la-

* This number corresponds to that of my Freycinetia delle Isole Filippine in Webbia III, 1910, and when the letter a, b, etc., is added to this number, it shows where the species must be interpoleted according to its affinities.

tis, ambitu rotundatis, apice acutis, marginibus apicem versus dentato-fimbriatis; laminae marginibus in parte basilari dentibus remotiusculis, parvis, brevibus, validiusculis, acutis, subhorizontalibus praeditis, apicem versus brevi-tractu minute remote denticulato-serratis, caetero inermibus; costa media acute prominula, in tertia superiori parte tantum spinuloso-denticulata. Inflorescentia terna, valida. Syncarpia cylindracea; pedicellis robustis, 2.5 cent. longis, 1 cent. crassis, scabridis, nec squamulosis; parte fructifera 11 cent. longa, 3-3.5 cent. crassa. Baccae numerosissimae, confertae, anguste lineares, 12-14 mill. longae, prismaticae, irregulariter acute pentagonae, vix 1 mill. crassae; parte seminifera 9 mill. longa; parte apicali brevissima, 1 mill. longa, subpyramidata, vertice plano circum annulato; stigmata duo ab annulo cincta. Semina oblonga, 2 mill. longa, minute striatula; raphe lateraliter, angustissima, alba, lateraliter percursa.

Habitat:—In well drained soil of wooded ravines along the Colon creek at 1350 m. (4000 feet). Todaya (Mt. Apo), District of Davao, Island of Mindanao, May, 1909. *Elmer* Philip. pl. n. 10781. (Herb. *Martelli*).

3[b]. **Freycinetia gitingiana Martelli** sp. nova

Caulis 2.5 cent. crassus, teres griseo-flavescens, annulato-cicatricosus, internodis 2.5 cent. longis, apicem versus tantum abunde ramosus. Folia in coronam ad apicem ramulorum conferta, erecto-ascendentia, apice recurvo, coriacea, late loriformia, 3.5-4 cent. lata, 70 cent. longa, apice subabrupte attenuata et in acumine subulato, breviusculo terminata, basin versus paullo angustata, ibique arcuata et profunde canaliculata, utrinque longitudinaliter conspicue venosa, apicem versus in pagina inferiori obscure tessellata; auriculis, praecipue apicem versus, violaceis, in sicco persaepe purpurascentibus subrectangularibus, 9 cent. longis, circiter 1 cent. latis, apice subrotundato-truncatis. Inflorescentia valida, terna; pedicellis 7 cent. longis, 5 mill. crassis, squamuloso-scabridis, basi laevibus; parte fructifera cylindracea, 12 cent. longa, 4 cent. crassa. Baccae numerosae, confertae, lineares, prismatico-pentagonae, 14 mill. longae; parte seminifera 9 mill. longa, subfusiforme, 2 mill. crassa; parte apicali libera 4 mill. longa,

subulato-costulata, in dimidia superiori parte pyramidata, vertice angusto, late annulato. Stigmata duo, confluentia. Semina oblonga, leviter falcata, 1.5 mill. longa, a raphe angusta alba percursa.

Habitat:—In shallow soil with a shale subsoil of dry forests along the trail toward España at 500 m. (1750 feet). Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910. *Elmer* Philip. pl. n. 12358. (Herb. *Martelli*).

Stem 1 inch thick, terete, ringed every inch toward the top, yellowish gray except for the blunt spinules, mostly branched toward the top only; wood quite hard, porous, fibrous in the center; leaves crowded toward the top, ascending, with recurved tips, coriaceous, shining deep green above, glaucous beneath, deeply caniculate on the upper side toward the base, sides more or less rolled upon the under side, margins smooth except at the base; stipule nearly 3 inches long and 0.5 inch wide, early becoming lacerated, its margins smooth and with apex roundly truncate, usually purplish toward the top; peduncle erect, subterete, 0.75 inch thick, 3 to 5 inches long; secondary ones 3 inches long, triangular and thinner; heads usually 3, divergent, 5 inches long, 2 inches thick, rugosely terete. (*Elmer* ms.)

3^{c}. **Freycinetia discoidea Martelli** sp. nova

Caulis teres, 1-1.5 cent. crassus, internodis 1 cent. longis. Folia numerosa secus ramos conferta, subimbricata, deflexa, coriacea, supra intense viridia, subtus nonnihil pallidiora, loriformia, 55-60 cent. longa, 2.5 cent. lata, apice acuminato-subulata, basin versus paullo angustata et canaliculata, ibique plus minusve arcuata, ima basi breviter amplectentia, utrinque crebre et conspicue longitudinaliter venosa; longis, auriculis membranaceis, angustis, 6-7 mill. latis, 7-8 cent. superne angustatis et apice subrotundatis, marginibus integerrimis; laminae marginibus in tertia inferiori parte breviter et minute dentatis, caeterum nudis, in extremo apice remotiuscule denticulatis; costa media in parte apicali tantum brevissime et remote spinulosa. Infructescentia terminalis, robusta; pedicellis griseo-lutescentibus (*Elmer*), 3.5 cent. longis,

4-6 mill. crassis, squamuloso-scabris, basi sublevibus; parte fructifera cylindracea, 6-8 cent. longa, 2-2.5 cent. crassa. Baccae numerosissimae confertae, lineares, prismatico-pentagonae, 11 mill. longae, 2.5-3 mill. crassae, in earum dimidia inferiori parte (5 mill. longa) seminifera, apice breviter incrassatae, acute angulosae quasi costulata superne brevissime pyramidatae, vertice late annulato, disciforme; stigmata duo, confluentia. Semina linearia, 1.5 mill. longa, raphe laterali alba percursa.

Habitat:—A twining climber, about small tree trunks, in gravelly soil of the woods along the Sinuban creek at 300 m. (1000 feet). Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910. *Elmer* Philip. pl. n. 12197. (Herb. *Martelli*).

Stem terete, at least 1 inch thick, conspicuously ringed every inch or less, occasionally giving off slender curved and half drooping branchlets; branches scarcely rebranched, bearing ample foliage; leaves descending, leathery, dull deep green above, 1 inch wide, 2 feet long, somewhat paler beneath, twisted toward the apex, the margins curved upon the lower side; infrutescence suberect, terminal, upon short 0.25 inch thick and conspicuously ringed peduncles; secondary peduncles triangular, yellowish green, 2 inches long; heads 3, of the same color except the brown stigmas, terete, 3 to 4 inches long, fully 1 inch thick, usually outwardly curved. (*Elmer* ms.)

12[a] **Freycinetia insipida Martelli** sp. nova

Caulis flexilis 1 cent. crassus sinuosus et nodosus vel obsolete spinosus, interdum ramosus, ligno inodoro et insipido, cortice cinerascenti vel lutescenti; ramulis 3-4 mill. crassis, dependentibus et intricatis. Folia 5 mill. dissita, reclinata, coriacea, anguste lineari-lanceolata, 18-20 cent. longa, 5-6 mill. lata, utrinque sensim attenuata, apicem versus longe acuminato-subulata, basi angustata, ibique non vaginantia nec amplectentia, utrinque crebre minute longitudinaleter venosa; auriculis subpersistentibus, albo-scariosis, 1.5-2 cent. longis, basi 5 mill. latis, lanceolatis, acutis, integris, costa media et laminae marginibus (apice tantum) minute et remote denticulatis. Folia floralia inferiora, foliis normalibus simillima, sed basin versus magis expansa et ovato-concavo-convexa, crebre venosa, ibique pallide vires-

centia. Spathae naviculares, ovato-lanceolatae, inferiores in appendicem, foliaceam plus-minusve protractae, caeterae acuminatae vel acutae, luteae, 4 cent. longae, 1.5 cent. latae, crassiusculae, longitudinaliter venosae, apicem versus ad margines et supra carinam denticulatae. Inflorescentia brevis, subracemosa, terna; pedicellis levibus, 6-10 mill. longis, 1.5-2 mill. crassis, saepe unusquisque spathe diminuta, solitaria, lanceolata munitis. Syncarpia pallide alba (immatura) cylindracea, 8-14 mill. longa, 4-5 mill. crassa. Baccis numerosis in vertice minime annulo cincti stigmata duo.

Habitat:—A loose climber over cliffs and upon medium sized trees extending over or partly into the Pauala river at 500-600 m. (1750-2000 feet). Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910. *Elmer* Philip. pl. n. 12426. (Herb. *Martelli*).

Stem 0.5 inch thick, bendable, occasionally branched, crooked and knotty and obscurely spinose; wood porous, whitish, odorless and tasteless; bark grayish or yellowish so, green beneath the epidermis; branches laxly rebranched, hanging, curved and with ascending tips, forming hanging and interlaced masses; leaves heavy, pendulous, leathery, dark green above, very slightly paler beneath, shallowly grooved along the upper side; inflorescence ascending, the outer bracts greenish, the inner ones deep yellow; stalks greenish; heads pale white, slightly odorous. (*Elmer* ms.)

Indigenous name "Baganot."

Sectio; **Pleiostigma**

1. **Freycinetia superba Martelli** sp. nova

Alte scandens, caudice elongato, solitario vel subsolitario, tereti, griseo-luteo, internodis 1 cent. longis, sparse spinis conicis praedito, interdum ad apicem ramoso, ramulis pendulis, numerosis intricatis. Folia numerosa, rigide-coriacea, imbricata, juniora ascendentia, adultiora deflexa, lineari-ensiformia, apice subulata, 70-85 cent. longa, 13-17 mill. lata, subtus glaucescentia, supra intense viridia, utrinque minutissime longitudinaliter crebrerrime venosa et in pagina superiori in dimidia superiori parte lineis impressis, minutis (e prefoliatione

enatis) longitudinaliter percursa; inferne canaliculata, basi aliquantum sensim dilatata et semiamplectentia, in ima basi dorso, in sicco, rufo, laevi et vernicoso; auriculis angustissimis, membranaceis, coloratis (?), 7 cent. longis, apice acutis; laminae marginibus minute et crebrerrime serratis, dentibus adpressis; costa media subtus prominenti e medio usque ad apicem crebrerrime spinuloso-serrata. Inflorescentia terminalis, terna vel quina, pedicellis fructiferis 4-4.5 cent. longis, 4-5 mill. crassis, apice et secus duas costulas furfuraceo-scabridis, caeterum levibus; parte baccifera cylindracea, 9-10 cent. longa, 14-17 mill. crassa, subteres, luteo-virescens (*Elmer*). Baccae confertae, numerosissimae, acute pentagonae; parte apicali libera brevissima, 2 mill. longa, crasse-coriacea, rotundato-pyramidata, pentagona, vertice latiusculo, plano, annulato. Stigmata 5 vel 4, interdum 6. Semina parva, rufa, curvula; raphe et strophiolo inconspicuis.

Habitat:—In good soil of forests on ridges or along streams at 300-600 m. (1000-2000 feet). Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910. *Elmer* Philip. pl. n. 12257. (Herb. *Martelli*).

A lofty tree climber; stem solitary or few, loosely twining about the tree trunks, occasionally branched, 1 inch thick, terete, ringed, beset with scattered conical spines; wood porous, quite rigid, sappy white, odorless, sweet, covered with yellowish gray bark; branches rather numerous toward the top or at the top, forming more a less tangled masses; branchlets slender, curved, drooping with suberect tips; leaves copious, rigidly coriaceous, dull green on the upper caniculate surface, paler or subglaucous green beneath, margins and the underside of the midrib above the middle finely serrate, not constricted toward the ascending base, the younger terminal leaves ascending, the older ones drooping, 2 to 3 feet long, 0.5 to 0.75 inch wide; infrutescence erect, upon a few inches long terete 0.75 inch thick ringed main stalk; secondary stalk yellowish green, 2 inches long; spikes 0.75 inch thick, subterete, 3 to 5, ascending, slightly outwardly curved, pale or yellowish green except the brown stigmas. (*Elmer* ms.)

16. **Freycinetia Elmeri Martelli** in Webbia III, 22.

Habitat:—In sticky red clay of woods along the trail to España at 600 m. (200 feet). Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, March, 1910. *Elmer* Philip. pl. n. 12072 masc. (Herb. *Martelli*).

The scandent stem is 3 inches thick, terete, flexible, provided with scattering spines; wood sappy white, the inner mass soft and fibrous; bark yellowish gray, smooth, green beneath the epidermis; branches scattered but more numerous toward the top where they form interlaced masses, slender, somewhat drooping, with green suberect tips; leaves alternate, arranged along the branchlets, ascending from the caniculate base, gracefully recurved otherwise, thickly coriaceous, deep shining green on the upper creased surface, a trifle paler beneath; inflorescence erect, creamy white, 3 to 5-spicate, the subtending lowermost bracts with green slender tips, the basal portion of the thick caducous bracts nearly salmon yellow, very sweetly fragrant. (*Elmer* ms.)

28. **Freycinetia megacarpa Merr.** in Philip. Journ. Sci. III, 314.

Habitat:—In moist fertile soil of humid woods along the Patoo river bank at 200 m. (750 feet). Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910. *Elmer* Philip. pl. n. 12270 masc. (Herb. *Martelli*).

Stem climbing up to 20 feet, only sparingly branched, 0.5 inch thick, wiry; wood quite hard, whitish, porous, odorless, sweet to taste; bark yellowish gray, smooth except for the rings and occasional spicule; leaves regularly scattered, thickly coriaceous, horizontal, slightly recurved, the green base ascending, paler green beneath; infrutescence subpendulous upon a short common ringed stalk; the peduncles of the 3 heads sparsely longer, greenish, not ringed; heads short ellipsoid, nearly 2 inches long, yellow but eventually turning red except the brown stigmas. (*Elmer* ms.)

31. **Freycinetia ensifolia Merr.** in Gov't. Lab. Publ. n. XVII, 5.

Habitat:—Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910. *Elmer* Philip. pl. n. 12426[a]. (Herb. *Martelli*).

34. **Freycinetia rostrata Merr.** in Philip. Journ. Sic. Suppl. I, 177.

Habitat:—In moist sand gravelly soil of wooded banks along the Patoo river at 200 m. (750 feet). Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910. *Elmer* Philip. pl. n. 12233. (Herb. *Martelli*).

Stem the thickness of a small finger, terete, occasionally branched divaricately, loosely climbing about its host or support, more or less crooked or ringed; wood whitish, slightly bitter, quite tough or brittle; bark smooth and brown; leaves horizontal, in 3 rows, tips usually recurved and twisted, coriaceous, much paler green beneath; the wide elongated stipules finely serrate, dry and brown, early separating from the true leaf base, varying from 2 to 5 inches long; twigs slender, lax, descendingly curved; heads 1 to 3, upon green and slender stalks, subglobose or more elongated, 1 inch across; drupes green, yellow and finally candy red but stigmas remain always green. (*Elmer* ms.)

Indigenous name "Sagatap".

PANDANUS

Sectio; **Keura**

Pandanus tectorius Sol. var. A.

Folia ut in var. precedenti. Syncarpium oblongum, 20 cent. longum, 18 cent. diam. Phalanges numerosae, 5.5 cent. longae, 2.5-3 cent. latae, irregulares, acute pentagonae, in fere dimidiam inferiorem partem cuneatae, basi subacutae, in dimidiam superiorem partem liberae sed approximatae, prismatico-subrectangulares, apice planae; loculis 8-12 mediocribus, rotundatis, angulosis, sulcis satis profundis, angustiusculis

separatis. Stigmata parva, acute prominentia. Endocarpuim osseum ambitu subrotundatum; mesocarpium medulloso-fibrosum.

Habitat:—Along the coast in sandy soil. Todaya (Mt. Apo), District of Davao, Island of Mindanao, October, 1909. *Elmer* Philip. pl. n. 11979[a] (Herb. *Martelli*).

Pandanus tectorius Sol. var. B.

Caespitosus, caudicibus reclinatis, ramosis, 8-13 cent. crassis, laevibus, griseo-lutescentibus, crebre lenticellosis; ramulis suberectis, 5-8 cent. crassis. Folia coriacea, metralia, ascendentia et in earum superiore parte deflexa, fere 5 cent. lata, basin versus profunde canaliculata et in ima basi breviter abrupteque paullo expansa, in dimidia superiore parte usque ad apicem sensim attenuata et in flagellum longiusculum desinentia, subtus glauca et longitudinaliter crebreque minutissime venosa, marginibus inferme remotiuscule attamen valide dentatis, dentibus albidis elongatis, acicularibus, rectis, patentibus, in dimidia inferiore foliorum parte brevibus et adpressis; costa media acute prominente, spinis brevibus, acicularibus munita, spinis basilaribus, crassioribus, subaduncis. Syncarpium solitarium terminale, ellipsoideum, 18 cent. longum, 13 cent. diam. viride, spathis plus-minusve numerosis indutum; pedunculo fere 30 cent. longo, trigono suffultum. Phalanges numerosae, obpyramidatae, 2.5-3 cent. latae, basi acutae, ambitu acute penta-exagonae; loculis 7-10, subaequalibus, parvis, superne depresse pyramidatis, a sulcis profundis separatis. Stigmata hipocrepiformia, parva, suberecta.

Habitat:—In brackish swamps along the coast at or near Daron. Todaya (Mt. Apo), District of Davao, Island of Mindanao, October, 1909. *Elmer* Philip. pl. n. 11979. (Herb. *Martelli*).

Stems reclining and branched, forming tangled masses, 3 to 5 inches thick, smooth, yellowish gray, obscurely ringed except below the foliage, covered with blunt lenticels; branchlets suberect, 2 to 3 inches thick below the foliage; leaves ascending, recurved above the middle or the slender tips descending, deeply grooved on the upper side toward the base, beneath glaucous green, the sharp spines whitish; fruit solitary, ellipsoid, 9 inches long at least, 6 inches across,

green, upon a recurved triangular more or less bracteated 1 foot long peduncle. (*Elmer* ms.)

Pandanus sibuyanensis Martelli sp. nova

Arbor 4-8 met. alta, erecta, trunco tereti (non plus quam 15 cent. diam.) parce ramosa, radicibus adventitiis, 5 cent. crassis, 1-1.5 met. longis emittente. Folia in coronam ad apicem ramulorum conferta, rigida, horizontalia, coriacea, linearia, 1.5-2.7 met. longa, 5-8 cent. lata, basi abrupte expansa, inferne usque ultra medium acute plicata et canaliculata, caeerum subplana, parte superiori recurva, apice acuta, utrintque crebre longitudinaliter venosa, basin versus in dorso leavia, supra minute tessellata; plicis lateralibus acutis, apicem versus, brevi tractu, interrupte spinuloso-dentatis et dentium impressionibus notata; marginibus valide, crebreque serrato-dentatis, dentibus acutis, patentibus, apicem versus brevissimis sed crererrimis; costa media valde prominenti et acute trigona, basins versus validiuscule et remotiuscule interrupte redunco-spinolosa, bcaeterum spinis brevissimis minutissimis, apicem versus crebrioribu munita. Racemus terminalis, pedunculo, circiter 60 cent. longo, 1.5 cent. lato, acute trigono, ad apicem trifido suffultus. Syncarpia tres, quorum 2 basilaria subsessilia, et 1 terminale longiuscule pedunculatum, omnia subaequalia, oblonga vel subglobosa, 14-16 cent. longa, 13-15 cent. lata, intense rubra. Phalanges numerosae, confertae, turbinatae, basi acutae nec fibrosae, 4-4.5 cent. longae, 2.5-3.5 cent. latae, irregulariter acute penta-exagonae, in earum parte superiori liberae, ibique rotundato-subpyramidatae, angulosae, in summo vertice late explanatae; loculis numerosis parvis, brevissimis, a sulcis rugosis, confusis separatis. Stigmata latiuscula, rotundato-cordata, subhippocrepiformia, horizontalia. Mesocarpium superum, spongioso-fibrosum, 12 mill. spissum; endocarpium osseum, in parte centrali situm et totam latitudinem phalangium occupans, superne inaequaliter truncatum.

Habitat:—Small groves in a fertile swampy flat of woods near the Pauala river at about 350 m. (1000 feet). Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, April, 1910. *Elmer* Philip. pl. n. 12146. (Herb. *Martelli*).

Stem terete, at most 6 inches thick, occasionally 3-branch-

ed from the middle but usually higher up, its proproots 2 inches thick, 5 to 7 feet high, yellowish gray, ringed, smooth except for the blunt spines; the main branches erect, the larger or longer ones again 3 branched; leaves crowded in 3 spiral rows at the top of the branchlets, mainly horizontally spreading, the apical portion especially recurved, quite rigid and coriaceous, deeply caniculate on the upper side toward the base, sublucid on the upper dark green side, lighter green beneath, margins serrate as well as the median vein beneath and the 2 lateral lines above toward the apex, 5 to 9 feet long, 2 to 3 inches wide, the base abruptly dilated; infrutescence terminal, with a lateral shoot arising from its basal side, pendulous upon a nearly 2 feet long green triangular peduncle which at the base is 0.5 inch across and at its distal end 1.25 inch thick, 3 branched at the end; each of the branchlets bearing a solitary head, the terminal one of which matures earlier; fruits short ellipsoid, 6 to 9 inches long, 6 inches wide across the middle, solid, heavy, dull red. (*Elmer* ms.)

Indigenous name "Pandan-bagas".

Pandanus mindanaensis Martelli sp. nova

Arbor 9 met. alta, ramosa, trunco circiter 20 cent. diam. flavescenti, radicibus adventitiis, circiter 2.5 met. longis, 5-8 cent. crassis, suffulto, ramis suberectis, circiter 2.5 met. longis, 8.5 cent. crassis, cinerascentibus. Folia ad apicem ramorum dense conferta e basi erecta, superne recurva, coriacea, 2.5-3 met. longa, 7-8 cent. lata, loriformia, apicem versus sensim attenuato-acuminata, in fere dimidia inferiore parte profunde canaliculata et plicata, caeterum quoque plicata sed expansa, in parte basilari valde incrassata, in ima basi breviter sensim beviter expansa, in pagina superiori intense viridia, ibique plicis lateralibus apicem versus acutiusculis et laevibus praedita, subtus glauca et crebre minute longitudinaliter venosa; marginibus crebre acute serratis, dentibus inferne robustiusculis et longiusculis, subulatis, irregularibus, rectis, valde patentibus, superne parvis, acutis, subappressis; costa media acuta et prominula, remote spinulosa. Inflorescentia terminalis racemosa; peduncolo recurvo, viridi, 30-35 cent. longo,

trigono, apicem versus incrassato. Syncarpia 3-5, conferta, subsessilia vel sessilia, globosa, 10-15 cent. diam., primum flavescentia, dein ad maturitatem intense rubra. Phalanges numerosae, confertae, obpyriformes vel ex apice lato et convexo basi attenuata, acute exagonae, 4 cent. longae, 19-23 mill. crassae, in earum dimidia superiore parte liberae, vertice lato, plano; loculis 6-10, parvis, approximatis, subconniventibus, a sulcis profundis, angustis separatis, extus acute angulosis et pyramidatis, apice acutis; stigmatibus latis, explanatis, hippocrepiformibus, late verticem repletentibus. Mesocarpium superum, dense lancunoso-fibrosum, 1 cent. latum; endocarpium osseum, centrale. 1.5 cent. latum, superne inaequaliter truncatum.

Habitat:—In dense humid forests south of the Baruring river at 1200 m. (4000 feet). Todaya (Mt. Apo), District of Davao, Island of Mindanao, June, 1909. *Elmer* Philip. pl. n. 10823. (Herb. *Martelli*).

Tree, 30 feet high, with an 8 inch stem; proproots ascending, strict, 2 to 3 inches thick, reaching a height of 8 feet; stem or wood rather hard without, soft and stringy within; bark yellowish, set with blunt cone shaped spines; main branches suberect, about 8 feet long, 3 to 5 inches thick, grayish, closely ringed; leaves densely crowded toward the top, in 3 strongly twisting rows, at the base slightly ascending, toward the ends recurved or when old broken and hanging, tips acuminate, base much flattened and expanded, glaucous green beneath, toward the base deeply grooved, margins sharply serrate especially toward the base, the keeled midrib beneath distantly so toward the top, the upper side dull green or somewhat glaucescent; infrutescence from the leaf axils, upon recurved 1.5 foot long green peduncle which gradually thickens toward the cluster, increasing from 0.5 inch to nearly 2 inches thick; heads mostly 5, globose, the largest 4 inches thick, closely set, the terminal ones smaller, turning yellowish, finally to a rich deep red. (*Elmer* ms.)

Sectio; **Hombronia**

Pandanus dubius Spreng. Syst. III, 897.

Habitat:—A heavy and clumsy appearing tree in soil of

a wooded limestone ridge terminating at the sea and within reach of the saline influences. Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, May, 1910. *Elmer* Philip. pl. n. 12438. (Herb. *Martelli*).

Stem 25 feet high, nearly the lower one half occupied by few and very thick proproots, 10 inches thick, the upper portion divided into widely spreading branches, the ultimate ones of which are ascending and 3 inches thick; wood soft, pulpy and stringy; bark yellowish, obscurely ringed, with conical excrescences; the leaves are similarly deep green on both sides, 3 to 5 or even 8 feet long, heavy, the basal one third erect, the apical portion twisted and pendulous, deeply grooved on the upper side toward the base, succulent, serrately spiny along the edges, 6 to 8 inches wide; the old or nearly decayed drupes 3 to 5 inches long; staminate inflorescence erect, terminal, 2 feet long, subtended by creamy yellow bracts. (*Elmer* ms.)

Indigenous name "Pandan-banang".

Sectio; **Bryantia**

Pandanus paloensis Elm. Leafl. Philip. Bot. I, 75.

Habitat:—In dry fertile soil of dense woods along a ridge leading to Mt. Burebid at 1000 m. (3250 feet). Todaya (Mt. Apo), District of Davao, Island of Mindanao, July, 1909. *Elmer* Philip. pl. n. 11224. (Herb. *Martelli*).

Small slender solitary trees; proproots 1 inch thick, terete, yellowish gray as is also the 3 inches thick stem, all provided with short blunt conical spines; stem 15 feet high, branched from the middle; branches ascending, 1 inch thick, terete, 1 to 3 feet long, unbranched, densely ringed; leaves crowded toward the tips, gracefully recurved, rather tough, dark shining green above, deeply grooved all along the upper surface, somewhat paler green beneath, keel beneath smooth except at the very tip, margins serrate or serrately spinulose especially toward the base; infrutescence arising from near the apex; peduncle ascending and recurved, 6 to 10 inches long, triangular, slender; usually 3 to 5 or even 7 heads in a cluster, 1.5 inches long by 1 inch across, obscurely ovoid, dull

red, subtended by marcescent bracts; the whole cluster subtended by foliaceous bracts. (*Elmer* ms.)

Indigenous name "Baroiy-latong".

Pandanus glauciphyllus C. B. Rob. in Bull. Torr. Bot. Club XXXV, 64.

Habitat:—On hills near the seacoast, Romblon, Island of Romblon, March, 1910. *Elmer* Philip. pl. n. 12153. (Herb. *Martelli*).

Small isolated trees; stem a few inches thick, 15 feet high, branched from the middle; bark yellowish gray, more or less provided with short blunt points; aerial roots short, rather few; leaves crowded toward the ends of the branchlets, at least 1 inch wide, a yard long, ascending, the apical portion recurved, paler green beneath; infrutescence solitary to each branch, terminal; peduncle 6 inches long, triangular, less than 0.5 inch thick; heads 5 to 7, closely set, bright red when mature, ovoidly triangular, the basal ones usually smaller, 2 to 3 inches long. (*Elmer* ms.)

Pandanus mapola Martelli sp. nova.

Arbuscula, 1.5-2 met. vel minus alta, caespitosa, ramosissima, trunco 8 et ultra cent. crasso, suberecto, tereti, flavescenti-griseo, spinis obtusis (*Elmer*) vel potius radicibus adventitiis spiniformibus ornato praedito. Folia dense ad apicem ramulorum conferta, ascendentia, apice flaccido-deplexo, 90-150 cent. longa, 4 cent. lata, basi fere usque ad medium acute et anguste canaliculato-plicata, apice attenuato-acuminata, utrinque (parte basilari in pagina inferiori excepta) minute tessellata, marginibus, acute dentatis, dentibus vulgo brevibus, acutis, in parte basilari validioribus et subhorizontalibus; costa media acuta, in parte basilari, longo tractu, spinis brevibus, crassiusculis, aduncis armata, caeterum nuda, apice minute spinulosa. Racemus terminalis, pedunculo circiter 30 cent. longo, acute trigono, fere digitis minoris crassitiae suffultus et spatha una vel duplex, foliacea in parte superiori praedito. Syncarpia 5-7 vel numerosiora ad apicem pedunculi dense conferta, unumquoque a

spatha marcescenti, suffulta, sessilia vel subsessilia, rubro-coccinea, ovoidea, trigona, 3.5-4 cent. lata et longa; drupae numerosae, confertae, parvae, 11 mill. longae, 5 mill. crassae, pentagonae, in earum parte superiori (4 mill. longa) pyramidato-rotundatae et liberae, summo vertice angustiusculo, gibbosulo sed in centro concaviusculo; stigmata exentrica, parva, plana, biloba vel integra et rotundata. Caverna mesocarpica apicalis, 2 mill. longa; endocarpium osseum supra medium drupae situm, 4 mill. longum, rotundatum vel inferne cuneatum, superne truncatum.

Habitat:—In compact fertile soil near *Nipa* swamps at 30 m. (100 feet). Magallanes (Mt. Giting-giting), Province of Capiz, Island of Sibuyan, March, 1910. *Elmer* Philip. pl. n. 12139. (Herb. *Martelli*).

Low, numerously branched shrub; stem 3 inches thick at least, suberect, usually few to several from the same cluster, 3 to 5 feet high or even less, terete, yellowish gray, ringed every 0.5 to 0.75 inch, beset with blunt spines, repeatedly rebranched, the latter with the copious leaves forming dense jungles; leaves crowded, ascending, the apical portion or one third deflexed, 3 to 5 feet long, somewhat paler green beneath, caniculate on the upper side especially toward the base, sharply serrate along the edges, scabrous along the apical median line beneath the blade; infrutescence terminal, upon 1 foot long and recurved triangular peduncle, usually 7 or more, the terminal ones ripening and falling earlier, dull brick red, sessile, triangularly ovoid. (*Elmer* ms.)

Indigenous name "Mapola".

Pandanus lateralis Martelli in Philip. Journ. Sci. III, 69.

Habitat:—In shrubberies of gulches in the cogon region at 300 m. (1000 feet). Todaya (Mt. Apo), District of Davao, Island of Mindanao, June, 1909. *Elmer* Philip. pl. n. 11029. (Herb. *Martelli*).

Stocky shrub or tree, 10 to 15 feet high; stem 3 to 5 inches thick, rebranched but usually several in a cluster, yellowish, densely ringed, with occasional blunt cone-like spines; leaves not very rigid at the base and quite limp towards the apex, divaricate, the tips pendulous, deeply grooved and

deeper green on the upper side, the base enlarged, retrorsely serrate on the keel beneath toward the base and serrate toward the apex, arranged in 3 rows which in the old stems are twisted; syncarpia upon 1 to 3 inches long ascending stalks which are strongly bracteated, promiscuously scattered beneath the foliage along the stem, densely surrounded by short marcescent bracts, 3 to 5 inches long; heads usually in a cluster, irregularly ovoid, bright red when mature, odorous. (*Elmer* ms.)

Pandanus barai Martelli sp. nova

Arbuscula, caudice 4.5 met. longo, 7-13 cent. diam., irregulariter tereti, griseo-lutescenti, tuberculis numerosis (radicibus adventitiis abortivis) praedito, parce ramoso, ramis curvis. Folia haud dense conferta, adultiora deplexa, superiora et novella ascendentia, recurva, elongato-linearia, 4 cent. lata, fere 150 cent. longa, apice acuta, in fere dimidia inferiore parte anguste et profunde canaliculata, basi abrupte paullo expansa, subtus glaucescentia, minute longitudinaliter venosa et obscure superficialiter minutissime tessellata, superne secus plicas laterales, longu tractu, apicem versus, crebre et ferociter spinulosa et dentium impressionibus notata, marginibus argute dentato-serratis, dentibus robustis, basin versus subhorizontalibus caeterum late divaricatis; costa media angusta et acute prominenti, basin versus spinis robustis, crassis, reduncis munita, caeterum nuda, apicem versus spinuloso-serrata. Racemus fructifer a syncarpis, 4-5 congestis compositus, subgloboso-ovoideus, 17 cent. longus, 12 cent. latus, pedunculo ascendenti-recurvo, 17 cent. longo, 2 cent. crasso, acute trigono suffultus. Singula syncarpia spatha propria praedita; spathis viridibus vel pallede flavescentibus, ovato-triangularibus, 3 cent. longis, 2.5 cent. latis, fimbriatis, marcescentibus. Syncarpia 7-9 cent. longa, 5-5.5 cent. diam., sessilia, curvula, trigono-pyramidata, faciebus exterioribus subconvexis, facie axile spectanti plana; drupae numerosae, confertae, 16-19 mill. longae, 5-7 mill. crassae, acute, penta-exagonae, e medio inferne cuneatae, basi acutae, superne acute pyramidatae et in parte libera, pileo 6-7 mill. longo, subcarnosulo, pyramidato-rotundato, anguloso, vertice subplano praedita. Stigma latiusculum,

planum, reniforme, in medio profunde excavatum et subbilobum. Caverna mesocarpica supera, acute conica, 4 mill. longa. Endocarpium osseum spissum, 1 cent. longum, superne planum.

Habitat:—In very moist humus covered soil on the north flank of the Baruring river at 1000 m. (3500 feet). Todaya (Mt. Apo), District of Davao, Island of Mindanao, June, 1909. *Elmer* Philip. pl. n. 10924. (Herb. *Martelli*).

A tree-like shrub; stem 3 to 5 inches thick, 15 feet high, irregularly terete, yellowish gray, covered with coarse spine-like tubercles; wood hard and whitish on the outside, pithy in the center, odorless and with a sweet taste; branches few and crooked, above the middle; twigs 2 inches thick, curvingly suberect; leaves not densely crowded in twisting rows, the upper ones ascendingly curved, the lower ones descending, lighter green beneath, grooved along the upper side, especially deeply so toward the base, spinescent on the margins and along the keel beneath toward the base, scabrid on the keel toward the apex, base abruptly broadened; infrutescence from the uppermost leaf axils, upon 6 inches long triangular 0.75 inch thick peduncle which from the base is ascending and ultimately becoming recurved; fruit cluster ovoid in outline, 7 inches long, 5 inches across the base; syncarpia 4 to 10, subtended by broad fimbriate marcescent bracts, triangularly flattened, 3 inches long, nearly as wide across the base, more flattened on the upper side, ovoid in outline, hard, green on the exposed sides, otherwise pale yellowish; drupes with rounded shoulders, bearing a solitary brown stigma. (*Elmer* ms.)

Indigenous name "*Barai*".

Pandanus calceiformis Martelli sp. nova

Arboreus, trunco 3-4.5 met. longo, circiter 15 cent. diam. ad apicem tantum breviter ramoso, flavescenti et spinis obtusis (*Elmer*) praedito. Folia ad apicem ramorum dense conferta, 1.7-2 met. longa, 4 cent. lata, coriacea, loriformia, recurva, apice breviter sensim acutata, in ima basi tantum paullo dilatata, e basi usque fere ad medium plicata et profunde canaliculata, caeterum subplana, in pagina

superiori viridia, subtus pallide glaucescentia, ibique crebre longitudinaliter venosa, utrinque minutissime obscure tessellata; plicis lateralibus superne in fere tertia superiore parte prominentibus et irregulariter crebreque acute spinosis; marginibus dentato-spinosis, dentibus in parte basilari validis, approximatis, irregularibus, longiusculis e basi lata, subulatis, horizontalibus, deinsuper plus-minusve patentibus, subulatis, rectis; costa media acute prominente, basin versus spinis robustis, recurvis, armata, caeterum nuda, in tertia superiore parte, crebre spinuloso-serrata. Inflorescentia apicalis, pedunculo 25 cent. longo, recurvo, digiti crassitiae, suffulta. Syncarpia 5 (persaepe 3, (*Elmer*) laxe approximata, spathis marcescentibus suffulta, rubescentia vel pallide lutescentia (*Elmer*), sessilia, oblonga, subtrigona, calceiformia, extus (sive in dorso) convexa et postice plana vel concava, 8-9 cent. long, 5-6 cent. lata. Drupae numerosissimae, confertae parvulae, 12-13 mill. longae, 6 mill. latae, in sicco fibrosae, exagonae (etiam 5-7 gonae), e medio usque ad basim cuneatae, deinsuper pyramidatae, parte apicali libera et a pileo facile secedenti involucratae; pileo membranaceo, 5 mill. longo, anguloso, pyramidato-rotundato, in vertice truncato et concavo. Stigma bilobum. Caverna mesocarpica supera, 3 mill. lata. Endocarpium osseum, spissum, cuneatum, 7 mill. longum, superne planum.

Habitat:—In dry soil of a wooded ridge near the Mainit creek at 1350 m. (4500 feet). Todaya (Mt. Apo), District of Davao, Island of Mindanao, September, 1909. *Elmer* Philip. pl. n. 11654. (Herb. *Martelli*).

Tree, from 10 to 15 feet high with a 5 inches thick stem; trunk yellowish, ringed, with blunt spines, short branched toward the top only. Leaves 6 feet long, densely clustered at the top, recurved, bright green above, somewhat paler beneath, deeply grooved on the upper side below the middle; peduncle from the uppermost leaf axils, 1.5 foot long, recurved; fruit cluster hanging, usually with 3 heads, each subtended by marcescent bracts, turning reddish or bright yellow when mature. (*Elmer* ms.)

Indigenous name "Barani."

Sectio; **Rykia**

Pandanus apoensis Martelli sp. nova

Arboreus, trunco 9 met. et ultra longo, solitario, circiter 20 cent. crasso, leavi sed tuberculis consperso, radicibus adventitiis 1.5-2 met. longis, 8 cent. crassis, teretibus emettenti, ramoso, ramis ascendentibus 8-13 cent. crassis, inferioribus 3.5 met. longis, furcatis (*Elmer*). Folia conferta, inferiora dependentia, superiora ascendentia, in apicem deflexum desinentia, modice coriacea, 2.3 met. et ultra longa, 5-7 cent. lata, in earum tertia inferiore parte sensim paullo attenuata, ibique profunde canaliculata, in ima basim paullo sensim expansa, superne explanata, attamen acute plicato et longe attenuato-acuminata, plicis lateralibus interdum in extremo apice superne dentibus nonnullis munitis, in pagina superiori obscure-viridia, in inferiori aliquantum pallidiora, utrinque longitudinaliter obsolete venosa (in foliis adultioribus basin versus subtus laevi) interdum etiam minute et superficialiter tessellata; marginibus argute crebreque serratis, dentibus brevibus; costa media basin versus tenui ibique brevi tractu spinulis parvis, tenuibus, subulatis armata, apicem versus acute prominenti, remote et minute spinulosa. Inflorescentiae racemosae numerosae, approximatae, infra foliorum comam circum caudicem vel ramos prodeuntes. Racemi adpressi, erecto-ascendentes, globoso-ovati 15 cent. longi, 10 cent. diam. syncarpis numerosis, pluriseriatis compositi; pedunculo brevi, crebre, spiraliter, bracteis imbricatis, inferioribus brevissimis, triangularibus, acutis, superioribus lanceolatis, acutis, vestito. Syncarpis spathis specialibus submembranaceis, marcescentibus, concavo-convexis, ovatis et in margine rotundatis, in dorso carinatis involucrata, luteo-rubescentia compressa et fere lenticularia, 3-3.5 cent. longa, 4-4.5 cent. lata, 1.5-2 cent. crassa, externe plus minusve convexa et postice plana; syncarpia superiora basilaribus minora, syncarpium terminale parvum et subglobosum. Drupae numerosae, densae confertae, parvae, 6-9 mill. longae, 3-5 mill. crassae, penta-exagonae, cuneatae, in parte apicali tantum liberae, pileo 2.5 mill. longo, in sicco facile secedenti et rotundato-anguloso, indutae; pilei vertice explanato, disciformi-anguloso et in latere, stigmate spinescenti brevissimo, 1.5 mill. longo, sursum

envergti, interdum curvo, subcorneo, praedito. Caverna mesocarpica supera, parva, 1 mill. longa, semilenticularis. Endocarpium obpyriforme, 3.5 mill. longum.

Habitat:—In damp fertile humus covered soil of dense woods south of the Sibulan river at 1200 m. (4000 feet). Todaya (Mt. Apo), District of Davao, Island of Mindanao, August, 1909. *Elmer* Philip. pl. n. 11313. (Herb. *Martelli*).

Solitary tree; stem 30 feet high or higher, 7 inches thick, the basal 5 to 7 feet divided into proproots 3 inches thick, terete, yellowish, smooth except for the short conical spines; branches 3 to 5 inches thick, the lower or longer one 12 feet long; leaves crowded at the ends in dense twisting rows, the lower dry, the nether persisting ones hanging, the upper ones ascending with apical portion deflexed, deeply grooved on the upper slightly darker green surface, keel beneath more or less serrate throughout, margins sharply serrate toward the base; infrutescence composed of 3 to 5 syncarpia, clustered about the stem or rather branched immediately beneath the green foliage and more or less concealed by the old hanging foliage, divaricate and entirely covered over by numerous marcescent sheaths; peduncle a few inches long only, also covered with sheaths; syncarpium about 6 inches long, ovoid in shape, composed of 3 twisting rows of capitulae or small flattened heads closely set together and gradually reduced toward the apex (those at the base also reduced), averaging about 6 in a row; drupes pale, salmon red; stigma rather sharp and subpersistent. (*Elmer* ms.)

Indigenous name "*Maraia*".

Pandanus polyglossus Martelli sp. nova

Frequenter subcaespitosus. Caudices subabbreviati, 20-25 cent. crassi, ramosi, radicibus numerosis adventitiis 1.8-6 met. longis, 8-13 cent. crassis praediti; ramis circiter 2-6 met. longis, 7-13 cent. crassis, furcatis; ramulis in parte terminali erecto-ascendentibus. Folia conferta, ascendentia, superne deflexa, crasse coriacea, bimetralia et ultra, 8 cent. lata, basi non expansa, usque ad apicem sensim attenuata, ibique longe acuminata et quasi in flagellum breve producta, subtus glaucescentia et minutissime superficialiter crebrerrime longitudinaliter sub-

inconspique venosa, e basi usque fere ad medium profunde canaliculata, caeterum subplana; marginibus crebre et irregulariter serratis, dentibus parvis, subulatis, erectis, subapprexis, basilaribus conspicue divaricatis; plicis lateralibus tenuibus, inermibus; nonnullis, impressionibus e prefoliatione enatis, subobscure longitudinaliter percursa; costa media tenui, acuta, vix prominenti, nuda, apice tantum spinis remotis munita. Inflorescentia apicalis, erecta (pendula, *Elmer*), spicata, 85 cent. longa, pedunculo communi 2.5 cent. crasso, 25 cent. longo, parte fructifera 65 cent. longa. Syncarpia numerosa (16), remote subverticellata, vulgo sessilia, inferiora tantum breviter pedicellata, erecta, 8-15 cent. longa, 4 cent. lata, linguaeformia, in eorum parte intermedia subincrassata, apice subattenuato et obtusiusculo. Syncarpium apicale regulariter trigonum; syncarpia lateralia etiam trigona sed in parte axem spectanti plana, extus rotundata. Drupae numerossimae, confertae, luteae (submaturae), lineares, prismaticae, acute exagonae, sursum curvulae, 14 mill. longae, 3 mill. crassae; parte seminifera brevi, 4 mill. longa ad basin sita; parte apicali libera, 4-5 mill. longa et pyramidata, angulosa sursum curvula, stylo spinescenti flexuoso corneo terminata. Stigmata linearia sursum vergentia.

Habitat:—In moist humus covered soil upon a steep forested ravine of Mt. Calelan at 1350 m. (4500 feet). Todaya (Mt. Apo), District of Davao, Island of Mindanao, August, 1909. *Elmer* Philip. pl. n. 11335. (Herb. *Martelli*).

Usually in clusters of 1 to 3 stems; proproots 6 to 20 feet high, from 3 to 5 inches thick; body 8 to 10 inches thick, comparatively short; branches nearly as long as the proproots, widely spreading, rebranched, the apical portion suberect, from 3 to 5 inches thick; conical spines very blunt; bark grayish; leaves crowded at the ends of the branches, in 3 spirally twisted rows, the basal portion ascending, the apical portion deflexed, deeply grooved upon the upper side especially toward the base, glaucous, green, the keel smooth beneath; margins serrate, sharply and stoutly so toward the base, the slenderly acuminate apex usually split; infrutescence arising from the apex, pendulous upon a subterete 1 inch thick recurved 1.5 foot long peduncle; bracts all gone; syncarpia about 15, scattering along the 4 feet long yellowish green

rachis, 3 to 6 inches long, subparallel to the rachis, more or less flattened on the ventral side, rounded on the dorsal, sessile, the apical ones triangular and not reduced, 1.5 to 2 inches across; drupes turning yellow to dull yellow, with rather sharp recurved yellowish brown tips. (*Elmer* ms.)

Sectio; **Acrostigma**

Pandanus copelandi Merr. in Gov't. Lab. Publ. n. XVII, 7.

Habitat:—In rich moist soil of a densely wooded slope on the Talon side of the mountain range at 1000 m. (3000 feet). Todaya (Mt. Apo), District of Davao, Island of Mindanao, October, 1909. *Elmer* Philip. pl. n. 11901. (Herb. *Martelli*).

Clustered but occasionally solitary; stem 3 to 5 inches thick, ringed and with blunt spines, otherwise smooth and yellowish; aerial roots short; branches few and relatively short; stem about 12 feet high or higher; leaves copious, ascending, reduced above the middle, rigid, 2 inches wide, deeply grooved on the upper side, midvein beneath smooth, edges sharply serrate especially toward the base, slightly paler green and duller beneath; peduncle arising from the uppermost leaf axils, 3 feet long, ascending, triangular, bracteate especially toward the distal end, green, hard, 1 inch thick; syncarpia 3 to 5 clustered at the apex, ascending, 4 to 7 inches long, 2 to 3 inches across, pale yellowish but soon turning red, (*Elmer* ms.)

Indigenous name "Barieu."

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ERRATA

P. 763, l. 6 from bottom for 7967 read 9334
P. 769, l. 13 from bottom for 8142 read 9332
P. 775, l. 3 from bottom for 8233 read 9279
P. 785, l. 1 from top for Piper interrumptum read Piper interruptum
P. 787, l. 16 from bottom for 8303 read 9330
P. 821, l. 11 from bottom for A. acrophyllum read A. macrophyllum
P. 839, l. 15 from bottom for (Kze.) read (Ktze.)
P. 819, l. 3 from top for elleptica read elliptica
P. 840, l. 9 from top for Polypodim read Polypodium
P. 843, l. 16 from top for Swzt. read Swtz.
P. 847, l. 11 from top for Sarasinorvm read Sarasinorum
P. 848, l. 7 from bottom for Blme. read Blume.
P. 850, l. 10 from top for Cheiropleura biscuspis read Cheiropleura bicuspis
P. 851, l. 6 from top for Lycopodium verticillatum read Lycopodium verticellatum
P. 851, l. 3 from bottom insert "No. 10600"
P. 855, l. 1 from top for Fimbristylum read Fimbristylis
P. 865, l. 2 from bottom for C. manga read C. magna
P. 860, l. 1 from bottom place hyphen between "extra" and "Philippines"
P. 933, l. 5 from bottom for Seeman read Seemen
P. 947, ll. 1 and 5 from top for Gesneraceae read Gesneriaceae
P. 955, l. 17 from top for Dichotrichum read Dichrotrichum
P. 964, l. 3 from bottom for locatily read locality
P. 969, l. 15 from bottom read "preceding" instead of "succeeding"
P. 975, l. 15 from bottom for MacGregor read McGregor
P. 976, l. 1 from top for Oldenlandia apoenses read Oldenlandia apoensis
P. 981, ll. 11 and 12 from bottom for Greenea read Greenia
P. 988, between ll. 10 and 11 from bottom insert "Nauclea Forst."

P. 988, l. 10 from bottom for Nauclea forsterii read Nauclea forsteri
P. 1000, l. 2 from bottom for "I; 39, 1906" read "III; 165, 1908"
P. 1003, l. 15 from bottom for suffrustescent read suffrutescent
P. 1004, l. 13 from top for Randia ticaensis read Randia ticaoensis
P. 1010, l. 8 from bottom for 196 read 1906
P. 1021, l. 7 from bottom for "is" read "in"
P. 1021, l. 11 from bottom for paloense read paloensis
P. 1022, l. 11 from top for Psychotria cervinus read Psychotria cervina
P. 1027, l. 10 from top for staighter read straighter
P. 1040, l. 8 from bottom for H. moselayanum read H. moseleyanum
P. 1040, l. 15 from bottom for Mindano read Mindanao
P. 1059, l. 2 from bottom add "t" to "bu"
P. 1062, l. 8 from bottom for guatteriaefolia read guatteriifolia; likewise on p. 1064, l. 14 from bottom.
P. 1076, l. 11 from top for numerouly read numerously
P. 1082, l. 13 from top for Canarium toncalingii read Canarium tongcalingii; also on p. 1083, l. 4 from top for Data Toncaling read Data Tongcaling
P. 1087, l. 11 from bottom for C. ahernii read C. ahernianum
P. 1091, l. 6 from top for path read patch
P. 1093, l. 1 from top for species read number
P. 1100, l. 17 from bottom for Diplycosia baclayanensis read Diplycosia baclayanense
P. 1118, l. 6 from top for Sic. read Sci.

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